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ABSTRACT

The program agenda, roster of participants, report of the business meeting, and resolutions passed at the conference are reported in these proceedings. Presentations made at the meeting are reproduced in full or summarized. These include: TVA--A Pilot Plant in Environmental Education; Why an Energy Shortage?; Role of National Organizations in Resource Problem Solving; Auto Industry and Energy Conservation; Earth Resources Technology Satellite; Tennessee Master Plan for Environmental Education; Recycling; Strip Mine Land Reclamation; Energy Today and in the Future; Environmental Education Teacher Certification; CEA Organization--Where Do We Go From Here?; From Solid Waste to Energy; Government's Role in Disposal of Community Waste; Information Analysis and Dissemination in Environmental Education; USA's First Ecology Judge; Twelve Major Environmental Concepts--A Rationale; Land Use and Land Priorities; Training Program for Para-Professionals in Environmental Technology; Architecture and Environmental Education; World Environment--Opportunity to Learn Through Travel; An Overview of an Environmental Education Workshop USFS; Environmental Education--Bureau of Sport Fisheries and Wildlife; and Practical Aspects of Environmental Education. Environmental Progress Through Cooperation in Education served as the theme of the conference. (BL)

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REPORT OF THE PROCEEDINGS

20th NATIONAL CONSERVATION EDUCATION ASSOCIATION CONFERENCE

MURRAY STATE UNIVERSITY

MURRAY, KENTUCKY

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ENVIRONMENTAL PROGRESS THROUGH COOPERATION IN EDUCATION

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REPORT OF THE PROCEEDINGS

1973 CONSERVATION EDUCATION ASSOCIATION CONFERENCE

MURRAY STATE UNIVERSITY

MURRAY, KENTUCKY

"We come together as members of one great family, long separated from each other. In this family reunion we are here to talk of our environment. We must not shroud the truth in platitudes, propaganda, or self deception. Our position is too precarious, our problems too great, too perilous, too complicated to allow us this luxury.

"Everything that has gone before--the whole of man's plodding and stumbling since his beginning on this planet--has directed to a single point in history...the point at which we stand.

"You may be carrying the light so needed by another...let no one blow it out... but readily share it.

--Clarence Billings
CEA President

QUOTABLE QUOTES

"A successful conference is a state of mind...let it begin with me." ----- C. Billings

"All things by immortal power near or far
Hiddenly linked to each other are,
That thou can not stir a flower...
Without troubling a star." ----- Mayor McNutt

"Seeing is believing...the most convincing technique of education known to the profession." ----- Aubrey Wagner

"The purpose of environmental education is not protect the earth for earth's sake, but to protect the earth for man's sake." ----- Aubrey Wagner

"If you don't say anything, you won't be asked to repeat it." ----- C. Billings

"The environment is not inherited from our ancestors...only borrowed from our children." ----- L. Ginger

"All of us...each of you...possesses a great power. Your gospel is spread from you to others and from others to still others.

"We as human beings, have the one devine quality of choice, that we can make a better society...that we can build a better and cleaner environment...we can make our rivers flow pure again, as well as contaminate them. It is the strength of individuals." ----- Dr. Harry Sparks, President, Murray State University.

Barbara Horn, Editor

PROGRAM

20th NATIONAL CONSERVATION EDUCATION ASSOCIATION CONFERENCE

MURRAY STATE UNIVERSITY, MURRAY, KENTUCKY

August 12-16, 1973

ENVIRONMENTAL PROGRESS THROUGH COOPERATION IN EDUCATION

Sunday, August 12

1:00-4:00 p.m. Registration - Regents Hall

5:00-6:30 p.m. Dinner - Student Union Building Cafeteria

8:00 p.m. General Session - Mason Hall Nursing Building
Chairman - Clarence Billings, President, Conservation Education Association
Welcome - Dr. Harry Sparks, President, Murray State University
"Introduction to West Kentucky--Its History and Resources"--Dr. Ray Mofield, Murray State University

Monday, August 13

7:00-8:15 a.m. Breakfast - Student Union Building Cafeteria

8:45 a.m. General Session - University School Auditorium
Chairman - Mrs. Dolly McNutt, Mayor, Paducah, Kentucky
Welcome - Julian Carroll, Lt. Governor, Commonwealth of Kentucky
Keynote Address - Aubrey Wagner, Chairman, Board of Directors, Tennessee Valley Authority

10:15 a.m. Coffee Break - University School Lobby

10:45 a.m. Interest Group Sessions - Faculty Hall

"Role of National Organizations in Resource Problem-Solving" - Room 100
Chairman - Calvin Hibler, Texas Education Agency, Austin, Texas
Presenter - William J. Napier, National Wildlife Federation, Indianapolis, Indiana

"Auto Industry and Energy Conservation" - Room 201
Chairman - M. D. Hassell, Murray State University, Murray, Kentucky
Presenter - Ronald Weaver, Vice President, Environmental Activities Staff, General Motors, Warren, Michigan

"An Overview of an Environmental Education Workshop, USFS" - Room 101
Chairman - Jane Westenberger, Chief, Environmental Education Brancy, U. S. Forest Service
Panel - U. S. Forest Service Workshop Team

"Earth Resources Technological Satellite" - Room 102
Chairman - Ira L. Bray, USDA Forest Service, Atlanta, Georgia
Presenter - Dr. Donal Hook, Department of Forestry, University of Kentucky

"The Tennessee Master Plan for Environmental Education" - Room 103
Chairman - Dr. Paul Wishart, University of Tennessee, Knoxville, Tennessee
Presenter - Jerry Rice, Tennessee Department of Education, Nashville, Tennessee

"Recycling" - Room 202
Chairman - Dr. Paul Yambert, Southern Illinois University, Carbondale, Illinois
Presenter - Craig Schmidt, Adm. Vice President, Coca-Cola Bottling Company, Louisville, Kentucky

12:00 noon Lunch - Student Union Building Cafeteria

1:15 p.m. Interest Group Sessions - Faculty Hall

"Petroleum Crisis?" - Room 200
Chairman - William D. Richardson, East Texas State University, Commerce, Texas
Presenter - Thomas Maxedon, Kentucky Petroleum Council, Louisville, Kentucky

"Strip Mine Land Reclamation" - Room 100
Chairman - Carl Johnson, Utah State University, Logan Utah
Presenter - Jim Sandusky, Reclamation Supervisor, Peabody Coal Company, Greenville, Kentucky

"Energy Today and In the Future" - Room 201
Chairman - Martha Munzer, Mamaroneck, New York
Presenter - Graham Wells, Tennessee Valley Authority, Chattanooga, Tennessee

Monday, August 13 (continued)

1:15 p.m. (continued)

"Earth Resources Technological Satellite" - Room 102
Chairman - Ira Bray
Presenter - Dr. Donal Hook

"Environmental Education Teacher Certification" - Room 103
Chairman - Joe E. Wright, Office of Public Instruction, Indianapolis, Indiana
Panelists - Dr. Clyde Hibbs, Ball State University, Muncie, Indiana
Lynn Hodges, Department of Education, Frankfort, Kentucky

3:00 p.m.

"CEA Organization - Where Do We Go From Here?
Conference Planning for '74 - University School Auditorium
Chairman - Dr. Ed Ambry, Director, New Jersey State Council for Environmental Education, Montclair State College, Upper Montclair, New Jersey

5:30 p.m.

CEA President's Reception - Student Union Ballroom, Murray State University

6:30 p.m.

Dinner - Student Union Building Cafeteria

8:00 p.m.

Environmental Films - Second Floor Lobby, Regents Hall
Chairman - Lynn Hodges

Tuesday, August 14

7:00-8:15 a.m.

Breakfast - Student Union Building Cafeteria

9:00 a.m.

Tour Orientation - Regents Hall Parking Lot

9:15 a.m.

Tour - Area Education Facilities

9:15 a.m.

Tour Route - (Tour Guides on Buses are SCSA members)
Area 1 - Murray State University Biological Station
Area 2 - Land Between the Lakes Environmental Education Center
Area 3 - Kentucky Dam. Largest dam on the Tennessee River
Area 4 - Camp Currie. Junior conservation camp sponsored by the Kentucky Department of Fish and Wildlife Resources

5:30 p.m.

Dinner - (Outdoors) Regents Hall Rear Area. Price included in Tour Ticket. Others $2.00 or eat in SUB cafeteria. Evening on your own.

Wednesday, August 15

7:00-8:15 a.m.

Breakfast - Student Union Building Cafeteria

9:00-10:15 a.m.

"Why An Energy Shortage?" - Room 200
Chairman - Claude Crowley, Soil Conservation Service, Fort Worth, Texas
Presenter - John R. Farrell, Manager, Manufacturing Services, Tappan Company, Murray, Kentucky

"From Solid Waste to Energy" - Room 200
Chairman - Robert Brown, Soil Conservation Service, Mayfield, Kentucky
Presenter - Ed Wisely, Vice President, Horner and Shiffrin, St. Louis, Missouri

"Government's Role in Disposal of Community Waste" - Room 201
Chairman - James Bailey, Tennessee Department of Conservation, Nashville, Tennessee
Presenter - Dr. F. E. Gartrell, Tennessee Valley Authority, Chattanooga, Tennessee

"Information Analysis and Dissemination in Environmental Education" - Room 100
Chairman - Delmar Janke, Texas A&M University, College Station, Texas
Presenter - Dr. Robert Roth, Ohio State University, Columbus, Ohio

"Outdoor Education for the Disadvantages" - Room 101
Chairman - Sam Johnson, Director of Youth Activity, Ft. Campbell, Kentucky
Presenter - James Biggs, Murray State University, Murray, Kentucky

"USA's First Ecology Judge" - Room 202
Chairman - Dr. Dean Bennett, Maine Environmental Project, Yarmouth, Maine
Presenter - Judge William Walden, Ecology Court, Louisville, Kentucky

"Twelve Major Environmental Concepts - A Rationale" - Room 102
Chairman - James Gilpin, Kentucky Department of Fish and Wildlife Resources, Frankfort, Kentucky
Presenter - Robert J. Warpinski, Project I-C-E (Instruction-Curriculum-Environment), Green Bay, Wisconsin

10:15 a.m.

Coffee Break - Faculty Hall - First Floor

Wednesday, August 15 (continued)

10:45 a.m.	Interest Group Sessions - Faculty Hall
	"Land Use and Land Priorities" - Room 200 Chairman - Harvey Bradley, U. S. Soil Conservation Service, Lexington, Kentucky Presenter - Walter Jeske, U. S. Department of Agriculture, Washington, D. C.
	"Training Program for Para-Professionals in Environmental Technology" - Room 100 Chairman - Dr. Roy White, University of Montana, Missoula, Montana Presenter - Wayne Hewell, Christian County Vocational School, Hopkinsville, Kentucky
	"World Environment-Opportunity to Learn Through Travel" - Room 201 Chairman - Walter F. Van Dien, Okemos, Michigan Presenter - Stanford Hendrickson, Murray State University, Murray, Kentucky
	"USA's First Ecology Judge" - Room 202 Chairman - Dr. Dean Bennett Presenter - Judge William Walden
	"Architecture and Environmental Education" - Room 101 Chairman - Bernard Clausen, University of Northern Iowa, Cedar Falls, Iowa Panelists - Thomas Worden, Tennessee Valley Authority, Knowville, Tennessee; Herb Burns, Housing Aid Corporation, Lexington, Kentucky
	"Environmental Education-ERV" - Room 102 Chairman - Elizabeth Roller, Metropolitan Public Schools, Nashville, Tennessee Presenter - Jerry Howell, Morehead State University, Morehead, Kentucky
	"Environmental Education-Bureau of Sport Fisheries and Wildlife" - Room 103 Chairman - William L. Colpitts, Chief, Branch of Public Use, Division of Wildlife Refuge, U. S. Department of Interior, Washington, D. C. Panel - Bureau of Sport Fisheries and Wildlife Staff, Washington, D. C.
12:00 noon	Lunch - Student Union Building Cafeteria
1:30 p.m.	General Session - University School Auditorium Chairman - Lynn Hodges Speaker - Thomas Harris, Director, Department for Natural Resources and Environmental Protection
	"Practical Aspects of Environmental Education"
3:00 p.m.	Coffee Break - University School Lobby
3:30 p.m.	CEA Annual Business Meeting - University School Auditorium
7:00 p.m.	Annual Banquet - Ballroom, Student Union Building Speaker - Dr. Harry Sparks, President, Murray State University

Thursday, August 16

7:00 a.m.	Breakfast - Student Union Building Cafeteria
Special Women Activities	Dr. Halene Visher, CEA charter member in charge. Monday, August 13, 10 a.m. Coffee at President's home. Assembly at 9:30 a.m. in lobby of Regents Hall and go as a group. Wednesday, August 15, 10 a.m. Tour of Jessie Stuart Room - MSU Library. Assemble in lobby of Regents Hall at 9:30 a.m.
Recreational Facilities	Failey Gore, Dept. of HPER, in charge. Tennis Courts available on first come basis. Indoor swimming pool in Carr Health Bldg., 9:30 & 11 a.m.; 2:00-3:30 p.m.
Door Prizes	At beginning of General Sessions. Sunday evening, Monday morning, Wednesday afternoon and annual banquet.

TVA--A PILOT PLANT IN ENVIRONMENTAL EDUCATION

Aubrey J. Wagner, Chairman, Tennessee Valley Authority

The environment and what to do about it is a controversial and often discussed subject in newspapers of the day, on television, and in many households throughout the United States. The words ecology and environment are on the lips of almost every American these days while the Nation and its citizens attempt to come to grips with the problems of pollution. The people of the United States have made it very clear that we simply cannot tolerate continuation of the environmental degradation that has come to mark our urban-industrial society.

TVA, from its very inception in 1933, has been deeply committed to the tasks of overall environmental improvement. TVA was the first agency of the Federal Government whose basic legislation reflected the Nation's growing ecological awareness. Today, 40 years later, TVA remains the only Federal agency equipped by statute and administrative structure to reflect the total economic and environmental concerns of the people of an entire major river basin.

Much has changed since 1933, yet much remains the same. Our concerns in 1933 were economic and environmental: Land and water use, jobs, income levels, health, agriculture, soil erosion, flood control, navigation, generation and sale of electric energy, forestry, wildlife, and, yes, even in those days, recreation. These concerns were all considered vital to and inherent in the search for true quality environment. They are still reflected in the headlines of today's newspapers, and they are still the subjects of meetings such as this.

Meanwhile the Tennessee has changed from an erratic river that alternated between unrestrained floods and low flows that could barely float a johnboat. As we were so forcefully reminded last spring, nature on occasion still hurls at us her rampaging floods. But in the Tennessee Valley they are restrained if not entirely curbed. Low summer flows are augmented from winter's stored floodwaters to support man's commerce and industry as well as his water-based recreation. And the Tennessee is one of the few rivers in the country whose water quality is better today than it was in 1933--this despite extensive growth of industries, cities, and recreation facilities that line its banks.

Fields that in 1933 bled from erosion are now healed. Forests that were being mined and burned each year are now yielding more timber and pulpwood than ever before. Yet each year they grow more than we cut. Both healthy fields and abundant timber lands now grace our lakeshores to provide an attractive environment for lakeside homes, parks, and industries and for water-based commerce and recreation.

The Conservation Education Association, I understand, was formed in 1953. Since then it has sought to promote conservation education at all levels. I am delighted to learn that you interpret conservation in its broadest sense, as does TVA, to include man's relation to and dependence upon his total environment. As I have sought to learn about the work of the Association I find that we in TVA share not only your goals but many of the methods which you seek to pursue.

For these reasons, we believe that TVA and the region in which it works should serve the Nation as a pilot plant in environmental education.

Here, for 40 years we have been at work with the region's people to find how badly needed economic gains could be made in harmony with better conservation of the natural resources that must provide the base for those gains. Here we have been learning how to overcome a social environment of joblessness and need without detriment to the natural, physical environment.

The 40-year partnership between TVA and the people and agencies of the region has endowed the area with a multitude of effective organizations which are carrying forward environmental education activities across a broad front. The demonstrations and research programs conducted by these organizations are serving as tools to educate the people in the Valley about the environment in which they live. As Marguerite Owen, former TVA representative in Washington, has said in her book The Tennessee Valley Authority, "Interest in training people is not new for TVA. From the beginning much of its work has been in the field of adult education."

For example, it has become apparent that much of the future growth in this region will occur in our smaller towns and cities. Eighty percent of industrial growth in recent years has been outside the metropolitan areas. To help communities improve their strength and atrractiveness as living places in this developing Tennessee Valley, TVA inaugurated the Townlift program in 1963. This effort originated in the concern of local leaders for revitalizing their deteriorating central business districts. The TVA Townlift program expanded this initial concern to include a team of planners, economists, engineers, architects, and landscape architects to take a broader view of communities. In addition to helping communities with their downtown areas, the Townlift team now helps with plans for recreation, industrialization, low-income neighborhoods, strip highway commercial areas, and other programs essential to the orderly growth of modern communities.

After the Townlift team provides a community with an analysis and a suggested remedy for their problem area, it is up to the local people to take action. If they catch the vision they will see that Operation Townlift involves creating a better living environment. TVA has given Operation Townlift help to approximately 100 communities to date and is presently working in 25 others. Considering the important role that our smaller towns and cities must play in providing quality living for more and more people in this industrial age, the Townlift demonstrations can have great pilot-plant significance.

Agriculture and agricultural education programs have been at the heart of economic and social change in the Tennessee Valley since the days of the early settlers. To bring about desired change a creative partnership was forged by private industry, land-grant universities, TVA, and thousands of farmers who were willing to take a chance on new ideas and technology. The effort paid handsome dividends. Thousands of acres of unproductive land were revitalized. Vastly greater amounts of farm products were produced. Farm income grew seven-fold. Production per man multiplied nearly 30 times.

The educational process does not stop with the farm manager. For the past 17 years we, the agricultural universities, and farm families have cooperatively sponsored the Fontana Resource Development Conference for outstanding 4-H Club members from every county in the Valley. These youngsters come together to learn about the basic resources of the Valley and how to better utilize and conserve them for present and future generations.

Our work continues and changes to meet the changing needs of the Nation's agriculture. As research and testing bring conclusive results, our findings are demonstrated in many ways. The cooperating demonstration farmer, an industry plant demonstration or educational program, technology symposiums provided by TVA for interested university and industry researchers are all important means of education and of adopting the benefits of technology and education.

The Tennessee Valley serves as a laboratory for demonstrating new approaches to the protection of land and water. Forests cover about two-thirds of the region. Their continuing availability and use are vital both to the economic welfare of the Valley's people and to the stability and strength of the Valley's land base. Tennessee Valley forests today contain nearly twice as much wood as they did 40 years ago and are growing each year over three times as much wood as the amount being harvested. Erosion has been controlled, fire losses cut to a fraction of former amounts, and wildlife populations increased.

Water and the way it is used are as vital to the Tennessee Valley in 1973 as they were in 1933, but the purposes water must serve today are more complex. In 1936 TVA began a continuing program of water quality surveys that identify pollution problems and needed improvements. These surveys helped the region's state governments in establishing stream pollution control programs which are effective today.

My point is not to give you a litany of past accomplishments. My point is that all of these efforts and more are being carried out in closest cooperation with the region's people under a unified plan of action with a single end purpose--to improve the quality of life--the environment--for people. Dams and power plants are not constructed as mere monuments to engineering excellence. Millions of trees and restored farmlands are not ends in themselves. All are conserved and developed and used to enrich the lives of human beings.

All of which relates to education and TVA's commitment to the human resource--the most vital facet of resource development. In other words, we do our best to improve the total human environment--environment defined as "the aggregate of all the external conditions and influences affecting the life and development of the human organism."

In 1963 TVA embarked on a new adventure in outdoor education and recreation in the Land Between The Lakes, a close neighbor of Murray State University where we are now meeting. We say this piece of land between Kentucky and Barkley Lakes, located within a day's drive for one-third of the Nation's population, as having unique potential. It could serve, in this day when so few of us live in close contact with the land, to teach us that we are still totally dependent on that land and upon its proper conservation and use. We believed that it could teach its lessons subtly to the vacationing camper and his family; or it could teach them more overtly in planned educational activities.

A member of the TVA Board in 1963 dalled Land Between The Lakes "the most exciting item on TVA's current docket."

It remains exciting today, even in the midst of our involvement in bringing on the line the world's largest nuclear electric generating station at Browns Ferry near Decatur in north Alabama. It remains so today, even as we join with others in perfecting the breeder nuclear reactor, the most promising source of continuing energy for the Nation and the world in the decades ahead. It remains so, especially as we continue our efforts to maintain ecological balance among the multitude of activities necessary to make the Tennessee Valley a place where one can continue both to earn a living and to enjoy that living.

President Kennedy, in making the Land Between The Lakes assignment to TVA, charged us with responsibility for demonstrating "how an area with limited timber, agricultural, and industrial resources can be converted into a recreation asset that will stimulate economic growth of the region. The assignment recognized that the demonstration would provide recreation opportunities for the surrounding region and for additional millions of people from America's industrial cities and from its agricultural heartland here in the Midwest near the junction of our mightiest inland rivers. But it would be more than another Federal recreation area. It would be designed as a place to learn as well as play. Land Between The Lakes would take its place along with other TVA activities that help make the Valley a pilot plant in environmental education.

With this background it is easy to see why environmental education has been a part of the Land Between The Lakes program from its beginning. In 1964, the year of its official opening for public use, Land Between The Lakes attracted about 12,000 people. In 1972 that total had jumped to nearly 2 million people from all over the globe, each of whom had taken something of Land Between the Lakes home with him--an idea, a memory, or a whole new philosophy of education.

For most visitors, recreation is the main attraction, with educational values incidental and often not even recognized. But more formal environmental education demonstrations and wildlife and forest management are also important aspects of the overall program, available to those who want them.

There are unlimited opportunities at this 170,000-acre area to enjoy camping, fishing, hunting, boating, hiking, or just being alone in the outdoors.

The natural resources in Land Between The Lakes are being developed and managed to increase the recreation and environmental education opportunities for the public and to provide better wildlife habitat while improving the area aesthetically. Wildlife habitat has been improved to accommodate large numbers of animals for the enjoyment of both sightseers and sporgsmen. Forest management is practiced on approximately 145,000 acres of this 40-mile-long peninsula to provide a well distributed and balanced supply of food and cover for wildlife and at the same time improve the stand quality, the usefulness, and the aesthetic appearance of the forest.

Visitors to the Environmental Education Center in Land Between The Lakes will discover a kaleidoscope of activities to excite their curiosity. For hikers there are scenic foot trails, varying in length from 1/5 to 5 miles, winding through forests rich in a variety of plant and animal life. Those who are interested in less strenuous activity may visit Center Station where films and displays tell the story of Land Between The Lakes. Or they may visit Empire Farm, an educational farm designed to familiarize visitors, especially children, with farm animals and the important role the farm plays in our society.

A major facility within the Environmental Education Center is the Youth Station, an outdoor school which is the focal point for resident environmental education programs in Land Between The Lakes. Six modern dormitories, a dining hall, and a resource materials center provide space for seventy-two persons. TVA personnel handle the food service, giving visitors the opportunity to devote all their time to educational programs. Teachers and administrators from local school systems who bring their classes to the Center are assisted by a professional TVA staff in planning a program specifically designed to meet the needs and interests of each class.

Thus, Land Between The Lakes plays a dual role in promoting environmental literacy. It incorporates the informal "soft-sell" environmental education designed to entertain the casual visitor; but it also includes structured, intensive in-service training for teachers, foresters, recreation specialists and students. Land Between The Lakes thus offers "something to take home." To play a truly effective role in environmental education, Land Between The Lakes must be a springboard back to the counties, towns, and cities from whence the people came. Our "take-home package" from Land Between The Lakes will hopefully develop and motivate the individual to support environmental education programs in the educational community and the community at large.

I have just learned about one family, from Des Plaines, Illinois, who have camped in Land Between The Lakes every year since its conception. They were back for their 10th annual vacation this summer--they, their nine children, and a friend. They have returned each year, they tell us, because Land Between The Lakes is a place to see and do. While camping with us, each member of the family can participate in the activity of his choice; and their choices range from fishing, boating, and swimming to learning arts and crafts, joining in a game of volleyball, watching the enactment of a living history program, learning about the management of natural resources by hiking along the "Trail of These Hills," or simply exploring back roads and trails to learn more about the area and its heritage.

This is the simplest, yet the most convincing technique of education known to the profession--"seeing is believing." TVA and the state agricultural universities used it forty years ago when the region, as I mentioned a moment ago, was plagued with erosion and pocked with gullies. The farm agents of the extension services sought out some of the bolder farmers who were willing to try new forms of agriculture in order to remedy the declining economic conditions caused by soil erosion. These farmers agreed to use TVA fertilizers in a way that would encourage the establishment of pastures, protecting the soil while providing greater incomes from animal agriculture.

The great appeal of the program stemmed from the fact that each of the test-demonstration farmers had to agree to let his neighbors come and see how this novel idea worked. Tours were organized and farmers in the vicinity saw for themselves the improvement that was possible. What their neighbors could do, they could do; and thousands followed in their footsteps. A revolution in farming took place in the Tennessee Valley in less than a generation. Seeing is believing, but believing can also be the motivation for action.

Later this week in Land Between The Lakes you will see the remains of an iron industry which more than a century ago flourished on the ore deposits of the vicinity and the forest which provided fuel for the smelting process. Science advanced here, for we believe what is now known as the Bessemer process of steel making was first used here. Jobs were provided for hundreds. But the iron resource was exhausted, and the forest depleted. The industry withered away, and those who had been employed were forced to make difficult adjustments.

We think it will not be lost on our visitors as they examine the remains of these old furnaces that the United States today is facing a depletion of vital resources which furnish some of the principal fuels for our energy supply. An energy crisis , we call it, and the Nation is in the process of making extensive adjustments, some of them revolutionary in character, to compensate for these resource changes. We hope that seeing this capsule experience out of the past in Land Between The Lakes will not only make "believers," but will help provide insight as we, as a nation, face up to the decisions and actions needed to meet our present day problems.

Educational systems mold the minds of the decision-makers of the future, and environmental concerns will most certainly be an urgent part of this future. Education at this time must assume responsibility for establishing among our youth an understanding of the simple basic unity of all resources and the complexity of the task of resource management which will be needed to sustain our globe as a living space for mankind.

The basic purpose of the more formalized educational program in Land Between The Lakes is to introduce sound environmental programming to as many educators as possible. Every teacher and administrator who comes here sees an innovative approach which provides direct, first-hand learning experience for his students. We hope that "seeing is believing" will be as fruitful for the teachers as for their students.

Everyone can't have the tools we have here. Not everyone can have 170,000 acres or even 1,000 acres. Everyone can't have two great dams, like Kentucky and Barkley, harnessing great rivers for a multitude of benefits; nor Empire Farms and extensive trails. But the principles used in these programs can be applied to almost any school campus, if it is developed properly, or to the vacant lot down the street. Outdoor classrooms can be found at almost any back door, and indoor classrooms can be coordinated with their use.

TVA's activities in Land Between The Lakes will not solve all of the schools' problems in regard to educating today's youth to become more aware of the world around them. We believe they will, however, direct those who use them along the path to a solution. The programs developed by the user school systems in cooperation with TVA staff in Land Between The Lakes are a concerted effort to insert the ever-present world of one's natural and cultural environment into the existing curriculum through the utilization of a systematic environmental education concept.

Land Between The Lakes has served as a pilot plant in environmental education. Its formalized programs have provided experience for 21,500 students and a training ground for teachers since 1966. Its camping areas, forests and trails have exposed millions more. Interest in environmental education is peculiar to no certain socio-economic level, age group, or geographical region. This fact is evidenced in the wide range of educational institutions participating in Land Between the Lakes programs. As we attent this conference, 14 high school boys from the Larkin Home for Children in Elgin, Illinois, a disadvantaged group, are in residence at the Youth Station. This is the third year Larkin has conducted programs in Land Between The Lakes. This summer, however, its program is unique. Career education in the fields of resource management, conservation, and park security are the primary objectives. The Land Between The Lakes staff is providing instructional leadership in fish sampling, wildlife surveys, traffic manipulation, and wildlife protection.

The environmental education facilities at Land Between The Lakes have served school classes ranging from inner-city Nashville to rural Brooksville, Kentucky, in the heart of Appalachia. The contrasting program needs of these two groups is indicative of the scope environmental education must assume to be truly effective.

In summary, we offer to you and to all who are interested, the Tennessee Valley and TVA's experience in it as a Pilot Plant in Environmental Education.

Here, in full-life scale, the region's people and their institutions have been at work with us for forty years in programs for resource use to build a better human environment. All across the region there is dramatic evidence of their success. At the same time, there is evidence of problems yet unsolved, of jobs still to be done.

Or, in more specific detail, the opportunities for teaching and training are available in Land Between The Lakes; for studying community growth in the Townlift effort; for learning in forestry and wildlife management; or agriculture; or land and water use; or any of the countless interest areas that make up our total environment.

We welcome your participation in this regional demonstration which is truly a partnership with the people.

* * * * *

WHY AN ENERGY SHORTAGE?

John R. Farrell, Manager, Manufacturing Services, Tappan Company, Murray, Kentucky

We have been reading and hearing of the energy shortage in the world today. Is it true or is the "energy crisis" a sham? A starting point for discussion is that there is no shortage of basix energy resources to be developed in the U. S. The Department of the Interior has made that point very forcefully in these words:

> "Our Nation has been bountifully endowed with a large resource base of fuel minerals, which includes petroleum, natural gas, coal, oil shale, uranium, and thorium. The energy content of known resources of these minerals amounts to 13,100 quadrillion BTU's, enough to last one hundred ninety years at the rate of consumption in 1970.
>
> "The potential resources of fuel minerals that are on the verge of use but await technological advance will last 16,500 years at the rate of energy use in 1970. A major national objective, then, is to identify and delineate these resources to develop the technology for utilizing them as they are needed."

The National Petroleum Council has estimated that 55 percent of the discoverable oil and 66 percent of the discoverable natural gas in this country are still in the ground waiting to be found. The problem is that, for lack of economic incentive and technological capability, those reserves are not being found and developed anywhere near the rate required to keep pace with rising demand.

Demand for fuel is enormous, America with only 6 percent of the world's population, consumes 33 percent of its energy and is increasing its energy consumption at a rate of more than 4 percent per year. Where does America's energy sources come from? In 1971, 43 percent of total U. S. energy consumption came from petroleum products, 33 percent from natural gas, and coal provided 20 percent with the remaining energy coming from hydroelectric and nuclear power. In 1972, each man, woman, and child in the United States consumed daily an equivalent of three gallons of oil and 300 cubic feet of gas.

Because of the tough new air pollution regulations being implemented, the use of coal is being replaced by low sulfur oil and natural gas. "Nowhere is natural gas' unique role in the cross fire between environmental needs and energy demand better demonstrated than in New York City. In announcing the Environmental Protection Agency's new air pollution regulations, Administrator William D. Ruckelshaus indicated that to meet the standards, the city would have to boost its use of natural gas by 300 percent. At the same time this announcement was bing made, the principal pipeline supplying natural gas to New York was reducing its deliveries by 7 percent."

The State Department points that coal near the big eastern market has a high sulfur content. Interior Assistant Secretary Dole points out "We have billions of dollars of investments in generating plants in the East and have not been amortized and must be kept going. Either we're going to have to import low sulfur coals or oils to utilize these plants, or devise a means for taking sulfur out."

These two examples point out the problems that exist when government becomes involved in something like "clear air standards." Many of the rules and regulations are so stringent that it forces burdens on the people which far outweigh the advantages. Rules are made without knowing what consequences might result.

To secure fuels to meet the needs of today, the United States is importing 23 percent of our oil. The paradox of domestic shortage and increasing foreign imports is that it is happening even though the experts declare there are abundant domestic resources, adequate for the foreseeable future and certainly sufficient until nuclear energy and other sources fulfill their promise for tomorrow.

The fact remains that none of the great oil producing regions of the United States has been adequately explored. Extensions to old fields at conventional depths and deeper are forecast for all regions. This is an indication of the abundance and great potential of resources. It is a reflection of the trend in the last decade of devoting a declining percentage of producing revenue to finding and developing production of crude oil and natural gas, a trend which has resulted in a drastic decline in exploratory and development drilling. This was happening at the same time E.P.A. was forcing users of coal to convert to clean fuel.

The National Petroleum Council sharply criticizes a series of government policies pertaining to the petroleum industry. They imply that environmental controls, tax rates, natural gas price regulation, and import policies will result in a sharp rise in national dependence on imported petroleum liquids. They also imply continuation of present government policies will result in available gas supplies being equal to only about one-half of market requirements in 1985. It is also apparent that efforts to abandon offshore drilling, blocking construction of an Alaskan oil transport pipeline and over-optimistic forecasts about the growth of nuclear power generation are some other policies and factors that brought about the present tightness of energy supply.

Robert G. Dunlap, Chairman of Sun Oil Company in an address at Dickinson College on February 2, 1973 stated his views as to why the energy shortage exists.

> "Five factors, or situations, are principally responsible for putting us where we are today. My purpose is not to assess blame but to pinpoint trouble spots that must be considered in looking for solutions.
>
> (1) Federal control of natural gas prices over the past eighteen (18) years is one of the key causes of our energy dilemma. First by holding the price of gas below market value it has reduced the incentive of producers to go out and find it. And, second, the low prices have artifically stimulated demand.---
>
> (2) Governmental opposition to higher crude oil and oil products.---The direct result of this long-run pattern of price depression has been a drilling slump that has seen exploratory wells drop from over 16,000 in 1956 to under 8,000 in 1972.
>
> (3) The helter-skelter approach to dealing with environmental problems has contributed directly to the energy squeeze. In many ways we have tried to do too much too soon, without a system of established priorities, with too little attention to the relationship of benefits to be obtained to costs to be incurred, and with overshadowing reason.
>
> The heart of the problem is sometimes referred to as 'the costly 10 percent.' Pollution control tends to rise gradually up to the point of 90 percent removal of pollutants, accelerate rapidly for the next 5 percent and rise astronomically for the final 5 percent.---
>
> A case in point is the system of standards adopted for motor vehicle emissions.---The U. S. Office of Science and Technology has estimated that motorists could pay up to $63 billion in added fuel and other costs over benefits in the 1976-1985 decade.---
>
> We have permitted essential energy development programs to be sidetracked or halted, nuclear power plants to be blocked, and plans for new refineries to be shelved.
>
> (4) Changing tax climate has reduced the dollars available to the industry for petroleum exploration and development.---Percentage depletion provisions designed to achieve this apply today to more than 100 minerals produced in the U. S.
>
> Up until 1969, the petroleum industry was allowed a 27 1/2 percent depletion deduction from taxable income from production. However, the Tax Reform Act of 1969 reduced this to 22 percent. This, with other changes, boosted petroleum industry taxes by approximately $600 million annually.---New Congressional pressures to reduce the rate of depletion again will further drain off investment funds. This is due to limitations on its use, is 18 rather than 22 percent.
>
> (5) The petroleum industry has simply not performed up to their potential in finding and developing new supplies of oil and gas. We failed in earlier years to sufficiently stress the development of new technology. The recovery rate of discovered oil has averaged only a little more than 30 percent. The potential for adding to our supplies through even modest increases in the percentage of oil recovered is tremendous."

Leroy Culbertson, Vice President of Phillips Petroleum Company as speaker at a symposium "Toward a National Energy Policy" on November 3, 1972, at Kansas State University said:

"That as a result of the Clear Air Act of 1970, refineries will have to process more crude oil to make gasoline lead free with sufficient octaine to operate the new automobiles. Based on one recent study the effect of auto emission requirements will result in an additional 1,280,000 barrels perday of crude oil by 1980.

"Increased incentives are essential to reviving the domestic oil and gas research and returning exploration to its health and vigor that existed in 1956 and previous years prior to effective federal regulation."

Because of the energy shortage we are experiencing in this country, more and more oil will have to be imported. Though some analyst claim the energy crisis is a fraud, their arguments are irrelevant. Industrialized countries find themselves facing effective demands from Arab and other oil nations, either by outright nationalization or by becoming partners of Western oil companies. Some experts predict Arab governments will be collecting as much as $40 billion annually in oil revenues by 1980, up from less than $5 billion in 1970.

The flood of dollars into Saudi Arabia threatens to become the number one problem of the world monetary system during the next decade. In another decade, this desert nation of five to eight million persons is likely to have reserves of about $30 billion in gold and foreign exchange. This would clearly turn that country into a monetary giant.

This year fuel imports will account for $2.5 billion of the U. S. payments deficit; experts predict the net cost in 1980 will be at least $10 billion.

The United States has been blessed with an abundant capability of growing more foodstuffs than it consumes itself and today food is our most attractive export commodity. Therefore, countries with a large dollar surplus are wanting to buy our foodstuffs which is forcing prices of these commodities to triple in price in one year which is affecting each family's standard of living in the United States. The energy shortage has a tremendous influence on this deficit balance of payment not only in oil imported but also the imported compact automobiles which have gained popularity because of lower energy consumption.

The situation of importing up to 15 million barrels of oil daily by 1980 results in Washington making a choice between preserving Israel or pacifying Arab oil producers. Admiral Zumwalt, the Navy boss, claims the Navy will need a fleet of shiny new destroyers by 1980 to provide safe passage for the 1,000 large civilian tankers.

In many ways the energy squeeze which the U. S. is experiencing today is a symptom of a much more basic problem that the petroleum industry defines as the "capital crisis." "It is estimated that petroleum companies must spend on the order of $7,000 for each additional barrel of daily oil output capacity, from finding to through delivery to consumer. And with demand now rising at the rate of roughly 700,000 barrels daily per year, it is apparent that capital requirements are growing very rapidly."

A leading investment banker, Kenneth E. Hill of Blyth Eastman Dillon and Company, Incorporated, drew the issue sharply at a recent energy policy conference, in these words.

"The capital requirements of the energy industry in 1970 were already quite large and steadily growing. The petroleum industry alone spent over $20 billion in the Free World, of which 40 percent, or $8 billion, was allocated to the United States. The public utility industry expended about $15 billion in the United States during 1970, which coal accounted for another several hundred million or so.--- The frightening fact is that even these enormous sums were quite inadequate to maintain any excess energy capacity, and electricity brown-outs, industrial shutdowns, and worse are expected in the years ahead."

The United States is no longer capable of being self-sufficient in energy supply. We are becoming increasingly dependent on foreign sources for our energy. Although an adequate supply of coal is available, air quality regulations restrict the use of high-sulfur coals.

Because of the tight air quality standards, the projected steady increase in demand for energy over the next fifteen years must be met principally by petroleum. Oil product demand is expected to increase by 4 percent per year for the next fifteen years, which is equivalent to a 75 percent increase over the period.

With most of the easy oil already discovered and produced, exploratory efforts are increasingly being concentrated in offshore and other areas where access is difficult, wells must go deeper and operating costs are higher. The average cost of drilling the average U. S. well rose from $55,000 to $95,000 in the last ten years. The average offshore well costs over $500,000 to drill and the average well in Alaska runs over $2 million. The Lone Star Gas Company's well in Oklahoma was completed in 1972 at a depth of 30,000 feet at a cost of $6 million.

Meeting the environmental goals that the nation has established will require very substantial additional investments by the petroleum industry. It is estimated that the capital required to remove lead from gasoline, get the sulfur out of crude oil, and upgrade water quality will total some $3 billion a year between now and 1980. Through improved technology, sulfur content of oil has been reduced by more than 50 percent since World War II.

Improving environmental conditions will increase consumption of energy. It is estimated, that an automobile designed to use unleaded, low-octane gasoline will use approximately 18 percent more fuel than a vehicle of conventional design. The National Petroleum Council estimated that capital required for U. S. petroleum investment plus American-financed overseas refineries will total $174 billion over the fifteen-year period.

In an environment marked by the political-economic policies that are in force today, serious questions are raised about the likely availability of needed capital. The oil industry historically has been able to generate virtually all of its capital internally from cash earnings. This was achieved in part by holding cash dividends to about 25 percent of earnings. By 1971 due to erosion of profitability, the industry was paying out a considerably higher proportion of earnings.

There must be an increased exploration activity for conventional gas and oil reserves in existing and new areas. There must be a substantial effort to develop alternate, or synthetic sources of energy to supplement conventional petroleum supplies.

The oil industry must concentrate on the offshore basins and the remote arctic areas of the world where the possibility for giant oil reserves still exist. Exxon has drilled and tested a well in 1,500 feet of water, and has designed a complete submerged production system that should operate in 2,000 feet of water. In the arctic, drilling must be undertaken in temperatures as low as minus 70° F. Some simple tasks become chores at these low temperatures.

The hope of the 1980's appears to lie more with synthetic fuels and alternate energy sources such as nuclear. Some exotic forms of energy, such as geothermal, solar and tidal will have to supplement synthetic hydrocarbons as important energy sources. Synthetics are much more costly. With existing known technologies equivalent costs estimates per barrel of synthetic crude will be from $6.00 to $8.00. Market price of crude today is about $4.00.

The Office of Emergency Preparedness did recommend investigation of the following avenues with the objective of improving our national energy picture:

1. Acceleration of offshore leasing;

2. Resolution of the problems inhibiting explorations and production in Alaska;

3. Some shifting to royalty leasing on a selective basis to generate exploration in previously untested areas;

4. Consideration of the tax treatment of oil to determine whether a difference should be established between exploration and development in secure areas as compared to insecure areas;

5. Systematic and timely balancing of environmental security and energy security objectives;

6. Steps to adjust natural gas regulation to avoid governmental underpricing of one fuel to the detriment of others;

7. Timely action on synthetics from coal, oil shale and tar sands;

8. Measures to reduce wasteful consumption;

9. Updating the Naval Petroleum Reserve Policies.

An article by Hal Lancaster in The Wall Street Journal on March 16, 1973, stated "gasoline prices might go up and up and up. One oil company vice president predicts the price for a gallon of regular gasoline will hit 50 cents within a few years while others see prices of $1.00 a gallon in five to ten years." The days of low priced petroleum products has ended. Low cost reserves are being depleted with future explorations and operating costs rising. An item in The Wall Street Journal on March 16, 1973, pointed out that a Shell-Exxon Team hit a $4.9 million dry hole in the North Sea.

We should have enough fuel to maintain the industrial might of this nation, however, some environmentalists are going to have to face reality and not go to extremes that the nation cannot afford. I believe improved technology will enable us to better use all fossil fuels and better utilize our petroleum reserves.

The economic climate of the petroleum industry is improving. Earnings by major companies were better in the fourth quarter of 1972 than they have been for some years. Prices being paid for petroleum products have improved and "gasoline wars" are ending after being in vogue in some sections of the country for many years. More money will be needed by the petroleum industry to meet this crisis and I believe they have the management and know how to accomplish this goal.

While the nation's energy woes have brought less than windfall profits to many petroleum firms, and even put a few out of business, the mounting demand for increasingly scarce fuels for the most part is clearly fostering a boom for a sizable assortment of companies and people in the petroleum industry.

June quarter profits for the 20 or so major oil and gas producers showed a strong rebound--up in some cases by more than 50 percent from the dismal showings of 1972. Although this turnaround hasn't solvedthe big firm's dilemma of rising costs and rapidly expanding capital needs, it certainly has helped.

My employer, The Tappan Company in Murray, Kentucky, is a manufacturer of household gas and electric ranges. They employ approximately 800 hourly employees and 120 salaried employees. Last December was our first indication of a pending natural gas shortage. We had a noninterruptable contract with the utility company which they canceled without notice and advised us that we were now on a winter allotment (November through March) which was 46 percent of our previous year's usage for the corresponding period. This notice was given us after we had already used 47.5 percent of our allotment in November. What were we to do? By continuing operations as we had we would shut

down by February resulting in over 900 employees out of work for two months. These 900 employees contribute approximately $175,000 a week in payroll to the community. Mass unemployment would have resulted in this community of 15,000 if the plant had closed and loses would be felt to the entire Tappan organization and its stockholders.

By making some fast decisions, rescheduling of product, checking availability of equipment, we were able to convert within four (4) weeks our boilers to burn low sulfur #2 fuel oil. Suppliers of this commodity were scarce, with only one major oil company agreeing to supply our demands. As a result of this fast action, only one week's production was lost in January and another week in February.

A concerted effort was made by all employees to reduce fuel consumption. Many heaters were shut off and overall conservation was being made. Equivalent BTU energy used for product produced by burning either natural gas or fuel oil was reduced 16.8 percent between 1970 and 1973. Electrical consumption was reduced 8.0 percent and water consumption was reduced 34.1 percent during this same period.

This indicates savings that can be accomplished when efforts are made to conserve energy. When such accomplishments can be shown by a medium-sized plant such as Tappan, what can others do? The only capital expenditure made was for a recirculating system for water where clean water is used more than once, before being discarded. Savings in the first year from this project more than paid for the capital expenditure.

We must conserve energy, but how? First, some relaxing of the quality air standards must be made where detrimental effects are minimal. The same resultant conditions do not result from similar pollutant concentrations. Many of the regulations were hastily written without conclusive facts as to health hazards.

Second: Use coal at points of large usage such as for generating electricity especially where generating plants are located in remote areas. Over 18 percent of our natural gas used in 1972 was for generating electricity. This natural gas would then be available for inherent efficient functions of cooking, water heating, clothes drying, residential and commercial space heating and industrial applications where other forms of energy are inefficient and/or extremely difficult to use.

Third: By using coal in our electrical generating plants, billions of gallons of fuel oil would then be made available for industrial plants generating steam for industrial processes. The natural gas now being used for the purposes would be diverted for more efficient uses as mentioned in item two. This would also reduce billions of gallons of crude oil which could be better used by the transportation industry in either fuel oil or gasoline.

Fourth: Conserve energy in all forms, not only the base form but electricity. One example: educating the public to conserve electricity, such as reducing lighting of buildings at night for esthetic appearances, restrict gas lights for residential lights. Let us all be smarter in our use of energy. Coal may be the fuel of the future, however, by regulatory measures, let us keep the clean fuels for homes and the more inherent efficient functions.

Our country has a high standard of living with many modern conveniences and appliances. All of us by doing our part, using energy conservatively would result in maintaining this high standard of living with fuels available until technology develops the energy system of the future, such as geothermal, solar and tidal.

* * * * *

ROLE OF NATIONAL ORGANIZATIONS IN RESOURCE PROBLEM SOLVING

William Napier, National Wildlife Federation, Indianapolis, Indiana

State and Federal agencies have many new roles to perform. Federal agencies used to be the ones that had the money, however, today state agencies are coming forward to help solve problems. Priorities seem to be set on a day-to-day basis, rather than on a long-range basis. Conservation education is beginning to pay off. There are approximately 3,000 organizations and clubs, with a membership close to 3 1/2 million, involved in conservation-environmental education. The Gallup Poll shows public awareness of environmental issues to be 85 percent. Energy seems to be the number one concern today, but what about land use. Continued education to all groups of people, planners and users is needed. Some states are not encouraging growth at this time. We have come to the point where it is time to "quit running." It is essential that we rework downtown areas of cities that have been abandoned. There is need for Eastern Wilderness development.

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AUTO INDUSTRY AND ENERGY CONSERVATION

Ron Weaver, Environmental Activities Staff, General Motors, Warren, Michigan

Man has long had the power to exploit nature. During his dominion, he has broken nearly every principle of ecology--and so far nearly gotten away with it. Only in recent years has man become aware of the consequences of misusing nature's abundant resources, from the fossil fuels below ground to the land, the forest and the waters above. And only now is man beginning to practice conservation to any degree and help re-establish some of nature's built-in balances.

The conviction that man can "conquer" nature is a dangerous illusion. We've been using the air as a sewer for the products of combustion. The evils of air pollution have been partially abated by concering coal-burning furnaces to natural gas and oil, and be devising methods to more completely burn the combustion products in our vehicles.

But the obvious paradox in this is that we've been burning up greater and greater quantities of gas and oil at the very time our supplies are diminishing. By trying to solve one problem with a simple solution, we have created another or made an existing one worse. This has made us a more energy-intensive society.

Few would deny that we have an energy problem. Evidence of it can be seen in power brown-outs and black-outs, cutbacks in natural gas service, increased oil imports, higher gasoline prices, shutdowns in the number of gasoline stations and the limiting of individual gasoline purchases. The problem is solvable, but many people think the situation will get worse before it gets better.

But to call it an energy "crisis" is to overstate the situation. I prefer to call it an energy "dilemma." The world still has an enormous supply of fossil fuel, but we must act to conserve it through wise management, and take the necessary steps to increase the supply, both domestically and worldwide.

President Nixon, in his long-awaited energy message to Congress earlier this year, defined the nation's need for an adequate supply of energy in the forms it needs, and recommended both short-term and long-term measures to ease the situation.

In industry, producing the products our society demands accounts for about 45 percent of all energy used in this country. This includes the primary energy sources--coal, oil and natural gas--as well as electricity. Therefore, we have an obligation to make certain that it is used in the most efficient manner possible. The enormous amount of energy industry uses, plus the growing shortage of available energy, points up the need for energy conservation.

The conservation I have in mind doesn't mean returning to the days of caves and candles. It means industry must turn out products more efficiently and, at the same time, make the performance of those products more efficient.

This is particularly true in the case of General Motors, because we depend upon large quantities of fuel, in one form or another, to keep our plants and products running. It may be of some interest to look at the things GM is doing to help ease the energy dilemma.

As a result of a corporate energy conservation program, one of our large Midwest plants has already achieved impressive results. The plant established a goal of 10 percent reduction in utilities usage in the summer of 1971.

Evaluation a year later showed a 30 percent reduction in water usage, a 23 percent reduction in steam, a 19 percent reduction in natural gas and a 3 percent reduction in electricity had been achieved. These reductions not only helped the energy shortage but yielded a handsome cost savings as well. This particular program now serves as a model for other GM plants. If such a performance could be matched by every plant and every industrial user, the nation would save an energy equivalent equal to about one-third of the total use of gasoline.

As part of the energy conservation program, a committee is investigating techniques of building construction from the standpoint of optimizing the use of energy and will develop criteria for use in designing new plants and updating old ones. In addition, GM has committed money and manpower to finding new ways of using coal without polluting the air. Coal, unlike oil and gas, is plentiful and doesn't have to be imported. Almost half of the world's coal supply is located in North America. Everything seems to point to coal as the fuel to use for industrial boilers and electrical production for both the short-term and long-term. It could additionally buy us time while we search for new domestic supplies of oil and natural gas, sink wells, build refineries and develop new, alternate sources of energy.

But coal poses two special problems. When mined, it scars the land; and when burned, it pollutes. To use coal as a fuel, it has to be cleaned up, and the restrictions on its use have to be relaxed until coal can be cleaned up economically. In line with our conviction that coal must be the primary boiler fuel for generating steam in most parts of the country, and recognizing the limitation on availability of low-sulfur coal, GM started investigating, back in 1968, the feasibility of removing sulfur dioxide from the high sulfur coal found mostly in the eastern part of the country. Low sulfur coal is located largely in the western part of the nation, and high transportation costs would be involved in transporting the coal to the markets in the east.

A pioneering project at our St. Louis plant resulted in a first generation scrubber which used a caustic solution to "wash" the sulfur dioxide from stack gas, just like a washing machine is used to remove soil from clothes.

We carried the system a step further in 1970 at our Chevrolet-Cleveland plant with a pilot study to determine if the caustic "washing" solution could be regenerated and put back in the system for reuse. Initial runs showed an SO_2 removal rate of better than 90 percent. This encouraged us to construct a full-scale system to prove total feasibility and, as it approaches the operational stage later this year, we have great hopes for effectively treating the stack gases and removing the dust particles.

The Environmental Protection Agency has singled out GM's work as one of the most promising experimental operations in the country. We have invited the E.P.A. to join with us in a joint study of the system, and we will make our results and experience available to any interested party. This system could be a major step in this country to encourage more use of coal, thereby taking the pressure off oil and gas as a boiler fuel for steam making.

GM is also in the early stages of investigating the feasibility of coal gasification to provide some of our energy needs. This process involves the chemical transformation of solid coal into clean-burning gaseous fuel. If you're wondering about GM going into the energy business, let me assure you that our only desire is to help ourselves and the national effort.

Some of our plants will supplement their energy needs by burning solid waste material. GMC truck and coach division, for instance, needed additional steam generation capacity, greater fuel flexibility and cost reduction in disposing of plant rubbish. They are solving these problems with two coal-fired boilers designed specifically to burn combustible wastes. About 55,000 tons of refuse per year will be burned, with a BTU value equivalent to 30,000 tons of coal. This much coal, at today's price, is worth about $450,000.

We are also trying to reduce natural gas energy needs by finding new ways of doing things in the manufacturing and assembly process. For example, we're testing the use of powder paint at our Framingham, Massachusetts, assembly plant. This advanced finishing technique may be one answer to eliminating sludge and solvent emissions from spray booths and ovens, and to conserving fuel supplies.

About five pounds of powder paint is required to coat a car body. The oversprayed powder is collected and reused, providing 100 percent material usage. The powder paint technique requires considerably less fresh air during application than does the present method of applying paint in solution form. And since about 1/2 our winter gas use in northern assembly plants is for heating fresh air from the spray booths, the potential energy savings, as well as pollution control gains, is significant.

Not only is GM concerned about getting enough energy to keep its plants in operation, but the energy used for transportation--25 percent of the nation's total annual consumption--is also of immediate concern to GM. There are over 100 million cars and trucks on the road and, as long as there is an energy problem, GM is going to be in the middle of it.

Suddenly there was the realization that compromises would have to be made to preserve the environment and provide a higher level of vehicle safety.

And then these later two criteria were compounded by the dramatic discovery that we could no longer proceed with the assumption that oil and thus gasoline would be forever cheap and plentiful.

These problems facing the use of personal transportation have now entered the political arena. Proposed solutions range from increased taxation on gasoline to development or more mass transit capability to the ultimate threat, gasoline rationing!

The automotive industry takes these potential constraints and developments seriously. GM builds buses for those people who choose it to go to work or to another city. We also build locomotive diesels which transport goods and people. Improvements in both these products are constantly underway, and GM is prepared to continue to participate and contribute to developments in better mass transportation.

On the other hand, we are aware of the automobile's relatively high propensity for consuming gasoline. Not only is this more expensive for the motorist, but more fuel gets burned at the very time the U.S. is in an energy-short marketplace.

It's no secret that a lighter, smaller, lower powered car will consume less fuel than its heavier, larger, higher powered counterpart. But the development of the automobile in this country has not followed the pattern of either light weight, small size or small engines.

The reasons are clear. The predominant American desire is to choose from among hundreds of models a vehicle offering both generous size and high performance.

Developments in the safety and emission areas have translated into even bigger, heavier, more fuel-thirsty vehicles. It's not hard, then, to understand why today's cars are increasingly becoming a target of abuse.

Increased vehicle weight is a contributing factor in the decline of fuel economy. Most of the added weight was "required" added equipment to meet government safety standards. A typical full size, four door, V-8 Chevrolet, for example, has increased from 3,605 pounds in 1963 to 4,284 pounds in 1973, an increase of 19 percent. This increase is due primarily to impact absorbing bumpers, frame changes, side-guard door beams and disc brakes as well as growth of the basic vehicle.

Emission control equipment, also required by the government, has had an adverse effect on fuel economy, too. With the exception of Cadillac, 1973 GM vehicles suffer 2 to 15 percent poorer fuel economy than their 1972 counterparts. Weighted on the basis of unit sales, gasoline mileage for 1973 is down 8 percent from 1972.

But the loss in fuel economy has not all been due to the government. Accessories requiring power from the engine have also had an influence on fuel economy. Automatic transmissions, power steering, power brakes and air conditioners are importantly related to the fuel economy potential of the car. While these losses may be only a few percent in highway driving, they can increase significantly in city traffic.

The manner in which the driver operates the vehicle affects fuel economy, too. Driving at 50 miles an hour rather than at 70 miles an hour could reduce fuel consumption by almost 20 percent. We are reminding our customers of good driving practices by distributing a brochure through our dealers. Also, our 1974 owner's manuals will explain what drivers can do to improve fuel economy.

In recent years, car buyers have changed their preferences to smaller, lighter cars. GM has responded to this shift in recent years by offering smaller cars in almost all car lines. During 1968, smaller and intermediate cars accounted for 41 percent of GM auto sales, while cars in this size range have accounted for 58 percent of GM sales during the first five months of 1973.

Certainly, there are opportunities for improved energy efficiency in our future products. Although final decisions have not been made on the 1975 emission control hardware, we do expect to use the catalytic converter in California and perhaps on most--if not all--cars nationwide. A great advantage of the catalytic converter is that it treats the exhaust after conbustion, allowing us to design and tune the engine for better performance and economy. Our experience with a number of test cars makes us optimistic that we will be able to improve fuel economy on 1975 models over 1973 levels. By 1975 the auto will no longer be a significant factor in pollution.

It is interesting to look at the history of the NO_x requirement in terms of the technical input which Congress had at its disposal. Almost all of that information has since been shown to be in error. NO_x controls are installed on less than 20 percent of the present car population, yet today's levels of NO_x emissions from all sources do not cause ambient problems in any but a few urban areas. This is the conclusion of an E.P.A. reassessment of erroneous measurements made a few years ago. The situation from the standpoing of the auto can only improve as new cars replace old ones. Therefore, the drastic 1976 standards are completely unrealistic.

E.P.A. now recognizes this and had said that it would petition Congress for a change in the law to modify the NO_x standard. At the same time, Congress and the E.P.A. should reconsider HC and CO standards for 1976 which not only are more severe than necessary but also make the NO_x standard harder to meet. The National Academy of Sciences has been asked by Senator Muskie and the E.P.A. to judge the adequacy of the health standards of the Clean Air Act, and to identify areas of uncertainty. Also, part of the congressional funding requires a cost/benefit study, for the first time. The general public and press are beginning to ask whether small additional benefits are worth sizable extra costs in dollars and increased energy consumption.

General Motors believes that Congress should freeze into law for several years the 1975 Federal Interim Standards for California. This would allow time for the completion of the standards study, further development of emission controls, and research on alternate power plants.

This ultimate decision by Congress is critical. But regardless of the outcome, General Motors has pledged a continued search for control methods that will perform the required job in the most effective way.

Soon to be activated is a field test fleet of 225 Chevrolets fitted with the 1975 catalytic emission control systems. These cars will be placed largely in taxi or other high urban mileage fleets in Los Angeles, Phoenix, and Denver, plus a few in police or highway operation in the New York and Cleveland areas. We hope that emission tests every 4 or 5 thousand miles will give us the durability information we need about both the catalytic converter, and indeed, the complete 1975 emission control system before the 1975 certification program begins.

In looking for more efficient engines, GM is searching for alternate means of propulsion. Of all the alternate powerplants, the rotary engine is the one GM is closest to producing in volume. If developments progress as we anticipate, we foresee introducing our version of the rotary on a limited basis in late summer of next year. Two factors which make the rotary so attractive are size and weight. The engine is 50 percent smaller and 30 percent lighter than a comparable piston engine. This opens up new avenues of vehicle configuration which can have significant indirect effects on vehicle size, energy and resource conservation, safety and comfort and convenience.

Improved efficiency of each of the operating components of the vehicle is also one of our goals. These components include the engine and transmission, as well as each of the power options or accessories. Tires illustrate one of the gains we have achieved. Steel-belted radial tires built to GM specifications will be offered on some of our 1974 models scheduled for public introduction late next month. They are expected to increase gas mileage by up to 5 percent, and, at the same time provide increased traction and lower noise.

In the search for better fuel economy, our engineers are also concerned about the aerodynamic shape of cars. Recently, we have been using Lockheed's wind tunnel for testing, and we are in the early stages of building our own full-sized wind tunnel to more readily explore the aerodynamics in our new car designs. Relatively small changes in car appearance can make a significant difference in wind resistance. With some designs, fuel economy has been improved up to one mile per gallon in highway driving.

The importance of adequate energy for industry and our country is fundamental and obvious. The proposals advanced to increase our future energy supplies are difficult and not universally popular. Government must act, but as citizens we must give the government our understanding and support.

Should allocation of fuels be necessary, we believe petroleum should be reserved primarily for those uses that are geared only to it, and for which there is no economically feasible alternative. These include transportation, home heating and certain agricultural purposes. Natural gas should have first priority in home heating rather than in industrial uses. The use of either natural gas or oil as a boiler fuel to generate electricity should have the lowest priority. We also favor the removal of all possible obstacles that slow the use of coal by electric utilities and large industrial boilers while maintaining a due regard for the environment.

Even as we advocate these steps, we in General Motors will rededicate our efforts to (1) conserve energy in our plants, (2) develop our system for the pollution-free burning of coal, (3) improve gas mileage in the cars and trucks we build, and (4) meet any future consumer demand for smaller, more energy-efficient engines and cars.

As a further indication of our determination to do our full share in the resolution of the energy question, we are pledging our complete and outspoken support for all reasonable governmental efforts to increase available energy and maintain maximum consumer choice. This nation has tremendous resources to respond to a national need when pressed to do so. That urgency is upon us. Whatever actions we take now--or fail to take--will likely affect us in the future.

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EARTH RESOURCES TECHNOLOGY SATELLITE

Dr. Donal Hook, Department of Forestry, University of Kentucky

On July 23, 1972, NASA launched a satellite into earth orbit at an altitude of 494 nautical miles above the earth. The satellite is sun-synchronized in a near polar orbit and passes over the U. S. between 9 and 10 a.m. Every 18th day it passes over the same point at the same time of day. The satellite was equipped with two sensing devices, a return beam vidicon (RBV camera and multi-spectral scanner (MSS)). ,Shortly after the satellite was placed in orbit a malfunction occurred in the circuitry and the RBV camera was turned off, but MSS has remained functional.

The MSS consists of four scanners of which each is sensitive to a particular portion of the electromagnetic spectrum, from 0.5 to 1.1 micrometers. This region covers most of the visible spectrum plus a portion of the near intrared region; therefore, it senses only reflected radiation. The data is collected in digital form and transmitted back to earth where it is converted into photographic form.

Obviously satellite technology has ushered in a new era of remote sensing. Although remote sensing has been in use since the early 1930's, it was primarily limited to aerial photographs. We now employ various types of film; infrared, false color infrared, natural color, and multispectral band films.

As a result of these advances our ability to discriminate among objects that were formerly undistinguishable on black and white panchromatic has greatly improved. We can now identify certain stress characteristics of vegetation caused by moisture, insects, disease, or any physiological or antomical disturbance that alters the reflectance characteristics of the plant.

Although most resource managers, planners, and decision makers are aware of the interrelationships of the ecosystem called earth, he has not fully appreciated the broad ramification of his actions on society and vice-versa. Thanks to "environmentalists" the resource managers and decision makers have been and are currently being made aware of their actions on the environment. Space photography seems to offer a common meeting ground for an interdiscipline approach in learning how to live with advanced technology.

Forest scientists used film copies from the Apollo 9 mission and developed a scheme of multi-stage sampling which permitted them to inventory the timber on 5 million acres of land in the Mississippi Delta. Using multi-stage sampling they were able to inventory the 5 million acres by using only 6 acres of ground plots. This sampling consists of scanning space photographs and delineating areas for more intensive sampling. Further sampling is achieved by successive under flights at various altitudes and finally by a few well selected ground plots to verify classification.

Other uses of space photography include: agriculture inventories, crop vigor, water quality, snow cover, ocean ice floats, land use classification and planning, and geologic surveys.

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TENNESSEE MASTER PLAN FOR ENVIRONMENTAL EDUCATION

Jerry Rice, Tennessee Department of Education, Knoxville, Tennessee

The 1972 State Conference on Environmental Education provided a listing of goals and objectives and suggested mechanisms for implementing these goals and objectives in an organized statewide environmental education program. To structure the recommendations of the statewide conference into a workable document, a three-day Master Plan Writing Conference was held. Approximately thirty participants representing public and private groups were invited to assist in the development of the Master Plan. The purpose of the Plan is to coordinate the efforts of local, state, federal and private groups who have an interest in the educational aspects of the environment.

The charge to the team was to develop a plan that would be flexible and easily modified to meet future needs. The emphasis of the Plan is on the proposed roles of various groups interested in environmental education. The Plan also includes suggestions concerning legislation, resource centers and plan evaluation.

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RECYCLING

Craig Schmidt, Adm. Vice President, Coca-Cola Bottling Company, Louisville, Kentucky

We were originally recycling 100 percent of our bottles. This situation has changed. In some areas of the country there are few returnable bottles. Glass is difficult to recycle. If more than 30 percent old glass were used in manufacturing other products it could result in an inferior product. However, recycled glass can be used for a number of items. Some items which can be made are bricks, vitreous tile, panel, glassphalt, spun glass for air filters and glass wool for insulation.

A portion of the soft drink industry dispenses their product in cans. If the cans are aluminum, these are very good for recycling. Ten million cans were recovered the first year of operation.

Other resources can also be recycled: water for washing trucks, crankcase oil, using plastic containers in preference to paper and saving the broken plastic containers to make new ones, and keeping trucks in good repair so that they will give long service.

Probably the two most important considerations in recycling are (1) is there a market for the particular product, and (2) who is to separate the material?

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STRIP MINE LAND RECLAMATION

Jim Sandusky, Reclamation Supervisor, Peabody Coal Company, Greenville, Kentucky

The nation possesses an abundance of natural resources. Withdrawals of resources are first for necessities and secondly to satisfy industrial demands. Early resource withdrawals were without regard to future consequences. Today, however, we recognize the necessity of maintaining a balance. Early withdrawals emphasized low cost and high profit. Major industry, today, looks at problems of upsetting the balance of nature. The coal industry opposes national reclamation regulations, due to the differences in conditions in each area. Each state should set specific regulations and enforcement measures.

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ENERGY TODAY AND IN THE FUTURE

T. Graham Wells, Jr., Assistant Manager of Power TVA, Chattanooga, Tennessee

We, as conservationists, are interested in the effects, the production and use of energy have on the environment and on resources. At the same time, we use a lot of energy in our everyday activities, so our interest is in whether or not an adequate supply will always be available.

TVA is the nation's largest electricity supplier and a primary concern with TVA is protecting the environment and making wise use of the Tennessee Valley region's resources.

There have been quite a few headlines recently about an impending "energy crisis" in America. What does the term mean--what are its dimensions?

To many of the lay public, energy crisis tends to be translated as inconvenience caused by brown-outs or black-outs. To others, it translates as approaching doom. But what we really should consider when we see or use that term is whether an energy crisis exists or will exist in terms of our nation's energy needs; how energy is being provided now and how it will be provided in the future; and how such provision may affect resources and the environment. Energy, without question, is of utmost importance to the social and economic well-being of America.

All of us are energy users. We've become so accustomed to flipping a switch in our homes, starting up an assembly line in a plant; driving our cars to work, enjoying a cool, comfortable lighted home--that the use of energy is second nature with us.

Currently, we have an energy bet before us--whether the nation will have enough energy to meet its needs in the near term and the long term future. Can we win the bet? I think the answer is affirmative--qualified to the extent that we will have some temporary shortages and that we are successful in solving some tough energy problems.

Already this summer we've seen indications of energy problems. Some gas stations are closing early and limiting the number of gallons you can buy. The word is out to natural gas customers about the restrictions being placed on the amounts available for purchase. Oil is in short supply also, and customers are having a hard time getting enough. The electric power supply situation is tight in some areas, and voltage has been reduced on occasion in the Midwest and Northeast. And all the while, prices of our fuel sources are trending upward.

As a step in the right direction, consumers are being advised to conserve energy. Certainly, we should use all energy wisely and conserve it where possible. But conservation will help only to a limited extent. What the nation must have is energy growth, because the need for more energy is increasing--more people, more homes, and more jobs. Adequate energy supplies are vital to the nation's safety, security and well-being.

To say that we need to increase the nation's energy supplies is simple enough. But doing it is something else--and unfortunately, not quite so simple.

Our domestic coal reserves are abundant--vast in relation to other energy reserves. And they are vast in relation to time--the nation has enough coal reserves to last for centuries.

I'm sure you see the connection--or disconnection, when you compare the reserves to current consumption. Our greatest energy use is in oil and gas. So we find this reserves-and-consumption pattern suggesting an imbalance.

Coal is far from meeting its potential, and our great dependence on gas and oil means that we could use up those reserves in a decade or so. Logic would indicate that we should find ways to make coal more useful, in a clean way, and that we should greatly expand the use of our uranium reserves through the development of the nuclear breeder reactor. Accomplishing this will take effort, research and money. We are using more gas and oil, relative to coal, because those fuels have been readily available and fairly easy to obtain in the past; they have been inexpensive to use; and relatively clean, in light of today's environmental requirements.

Coal is used to produce more than half of the nation's electricity. There is a small amount of nuclear electricity production. Nuclear power is just beginning to come on the scene as an important factor in power supply. There had been a recent increase in the use of gas and oil as fuels for power plants because some utilities find it easier to burn them to meet environmental standards. However, because of reserve limitations and supply problems, the use of gas and oil to produce electricity will decline.

Oil reserves are declining and oil production, which had been holding about steady, is beginning to decline. Forecasts by the Department of the Interior show that oil production cannot meet demands. It is expected that oil production will hold about steady, but the need and use of oil will steadily climb upward. Where is the additional oil that is needed coming from?

There are some potentials. Estimates of recoverable oil resources vary widely--they show substantial quantities yet to be found that could be produced at or near current economic and technological conditions. New technologies may develop to make use of shale oil, coal liquefaction, and tar sands; but it is not likely that technology will make these sources of much assistance before the turn of the century. It appears that more and more oil will have to be imported.

The nation now has a growing dependence on near east, or middle east oil. Those countries have the greatest amount of oil reserves by far, and we will rely heavily on increasing imports from them. The near east is an area of unstable conditions. Many have banded together into an organization of petroleum exporting countries to control prices and production. The effect on the United States balance of payments may not be desirable--the deficit for oil was $4 billion in 1971; it will increase to $25 billion to $30 billion in 1985 assuming current trends and policies. Also connected to increased importation is increasing problems of transportation, port facilities, and environmental concerns.

The domestic gas supply situation was in fairly good shape up until 1968--a good amount of reserves were being added. But now, with production still increasing, the alarming thing is the decline in year-end reserves of gas. As for the future, it is expected that there will be hardly any growth in domestic gas production. Synthetic gas may be of limited assistance. But as with oil, it seems the reliance on imported gas will increase.

The world reserves of gas supplies look promising. But there are questions as to the reliability of supply. Importing gas to U. S. shores would bring about the same problems we face with importing oil. Demands on gas are greatly increasing. Past growth of this fuel is due mostly to its availability and relatively low price. It is a very attractive fuel now for production processes because of the air quality standards being implemented. But with current shortages, it is difficult to obtain a gas supply for burning in electric power plants.

Utilities use the greatest amount of coal, and total coal consumption is running between 500 and 600 million tons a year. Coal resources come close to being astronomical. But again, we've got problems.

The problems include the locations of the reserves, the sulfur content of the coal, and the environmental concerns relating to both the mining and use of coal.

For example, a premium is being placed on low sulfur coal because it comes closest to meeting the air quality standards being established. For the largest quantities are out west, while the greatest market for coal is in the east. Expanding western mines to meet the east's needs will put great pressure on capital, manpower, and transportation facilities.

There also is a quality problem with western coal. Because of its low BTU and high moisture content, there are problems in burning it in facilities not designed to use it.

Coal, all coal, must continue to be a major fuel for utilities due to the lack of oil and gas, and until nuclear power can assume an increasing role. It would appear that uranium as an energy source--nuclear power--has come along in the nick of time.

It is projected that nuclear fuel will provide about 27 percent of all electric generation in 1985 and over 60 percent by the year 2000.

Uranium reserves are also limited, and the economically recoverable ones especially so. It appears, we're going to give out in several decades. But there is reason for optimism in considering uranium as an energy source. Uranium exploration is being expanded to add substantially to reserves, and the development of the nuclear breeder reactor will extend reserves for centuries. The breeder transforms nonfissionable material into fissionable material--it produces nuclear fuel while it consumes nuclear fuel.

It seems apparent that much of our future energy supply will increasingly be provided by electricity. Electricity must assume a much larger role in energy supply, serving some markets normally supplied by oil and gas.

Since electricity will be relied upon heavily to meet the nation's future energy needs, research expansion is paramount to make sure that our electricity supply is reliable, affordable and environmentally clean.

When we talk about the production and use of electricity, another factor, the environment--and the concern we have for it--certainly becomes a part of the subject and must be intertwined throughout. This concern is a major public issue, a cause which has no exclusive membership, and would seem to be taking its place in political rhetoric.

It is important to realize that our environment includes all the external influences and conditions that affect life. Webster describes it as surrounding, but further as "the complex of climatic, edaphic and biotic factors that act upon an organism or an ecological community and ultimately determine its form and survival."

All methods of thermal power generation produce waste products in the form of solids, liquids, gases, or heat. There is no alternative at this time with developed technology but to discharge these waste products into the air, or water, or on the land; our task is to find ways to utilize waste products in a useful manner, to remove harmful materials from them, or to neutralize their consequences.

In TVA we follow the thesis that the protection of the environment is a paramount consideration in producing the kilowatt. We are using all known technology and where technology does not now exist we are working to develop our own to ensure that our power facilities do no undue harm to the environment.

The principle pollutants put into the atmosphere by electric systems are the emissions from the stacks of steam plants that use fossil fuels, and the principle offenders are particulates--commonly called fly ash--and sulfur oxides.

By using the latest collection equipment available, TVA has been able to reduce the amount of fly ash coming from the stacks of its plants significantly since 1966, when we undertook a program to meet national particulate standards.

As a result of a continuing air pollution control program, representing about a $300 million investment, the precipitators we're installing are designed to collect more than 99 percent of all fly ash by about 1977. We will also achieve control of sulfur dioxide at ground level.

The burning of coal leaves a particularly unwanted byproduct--SO_2--sulfur dioxide. In too great amounts, sulfur dioxide is harmful. TVA has developed a control plan that is a promising and safe alternative to state-proposed SO_2 emission standards. These standards would limit the amount of SO_2 which could be emitted from the top of the stack at coal-fired steam plants. But there is no feasible way TVA could operate the plants and meet the standards. There are not sufficient quantities of low sulfur oil, natural gas, or low sulfur coal available to substantially reduce SO_2 emissions at TVA plants. Nor are stack gas scrubbers commercially available.

Consequently, TVA is proposing an alternate plan, becoming known as the "Paradise Plan" because its effectiveness was first proven at TVA's Paradise Steam Plant in Kentucky. The strategy entails increasing the height of plant stacks where necessary, the use of SO_2 monitors around the plants, a computerized system for determining SO_2 and weather factors, and a technician on hand to keep abreast of weather conditions. Under this plan, the SO_2 ambient standards can be met, and the air where people breathe and plants grow will be kept safe.

Only during a small percentage of the time annually, when weather conditions force emissions quickly to ground level, will it be necessary to cut back on the affected plant's operation or temporarily mix in lower sulfur coal in order to maintain levels. The Paradise Plan predicts these times and initiates the curtailment or fuel-mix operation required.

All states are developing standards for air quality control. Research on processes for SO_2 removal from stack gases before they are emitted is receiving a high priority, nationwide. As part of this research effort, TVA is designing and installing a full-scale scrubber on a 500,000-kilowatt generating unit at the Widows Creek Steam Plant. This will be one of the first such installations of its size in the country. And although its effectiveness and cost factors are yet to be determined, it is expected to contribute valuable information in the national effort to perfect sulfur dioxide control processes.

Land is another area of concern. If our predictions of colossal growth in the production and use of electric energy come to pass, some questions arise: Where is the electric industry going to put the hundreds of new plants that will be needed? How about the thousands of miles of transmission and distribution lines, along with their associated equipment?

We must select potential sites for new generating capacity early in the process of planning to meet future power requirements, fitting them into regional development plans and checking with all applicable agencies representing the public.

In view of some of the nationwide plant siting problems of today, I am reminded of an apt definition of an ideal site for a nuclear plant as "one for which there is no evidence of any seismic activity over the past millennia; is not subject to hurricanes, tornadoes, or floods. It should be in the midst of an endless expanse of unpopulated desert with an abundant supply of very cold water flowing nowhere and containing no aquatic life. Most important, it should be adjacent to a major electrical load center. If such there be, go mark it well, as it will have been designated as a national refuge for those unwilling to cope with the problems of living in this everyday world."

Power plants and transmission and distribution facilities are being designed to blend unobtrusively, even attractively, with their surroundings. Underground residential distribution of electricity is rapidly gaining acceptance.

The provision of energy must increase if our nation is to be competitive in the world and if our citizens are to continue living well and have an opportunity to fulfill their ambitions for a satisfying life.

I think it is the rate of energy growth that disturbs some people. The rate is high now and will be for some time into the future, partly because of the large number of post World War II children who are now growing up, seeking their own homes and jobs.

At some point in the future, I think the accelerated rate we're experiencing now--this need to double energy supply every decade or so, will moderate. By then, nuclear fusion may well be our primary energy source. Fusion will use a particularly limitless fuel--deuterium from the ocean. Fusion power is still a goal, and a lot of effort and expense must be expended to make it a reality.

An important question is, how are we going to meet energy growth between now and then...between today's prospect for critical shortages and the future's potential for abundance? A large part of the answer must come to us through research. In my estimation, our greatest research effort should be made in continuing the development of nuclear power and in transforming coal into a clean, liquid fuel. This will mean that we must successfully demonstrate the nuclear breeder reactor and find ways to make our abundant coal reserves fully useful.

Backed by the entire electric utility industry--municipal, cooperative, public and private systems--an Electric Power Research Institute has been formed to study and develop energy technologies.

Everyone has an interest in energy, whether they realize it or not. More and more, the American public is becoming aware of the energy situation. All of us can help by understanding the problems, making rational judgments, and promoting a national policy that will successfully place supply and demand in order.

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ENVIRONMENTAL EDUCATION TEACHER CERTIFICATION

Dr. Clyde Hibbs, Ball State University, Muncie, Indiana
Lynn Hodges, Department of Education, Frankfort, Kentucky

Teachers at all grade levels can and should be involved in environmental education. Teachers tend to make the program what it is. Availability of positions in environmental education is limited. Certification of some tends to reduce the amount of environmental education teaching by the noncertified, who feel it is up to the specialists, and may result in environmental education not being taught in some schools.

Proponents of certification point out a number of advantages:

1) Certification in an area does not preclude teaching environmental education by other teachers at all levels.
2) Teachers are better prepared to teach in this area.
3) Certified teachers could occupy a leadership role.
4) Responsibility is placed on a qualified person.
5) Certification is accepted as a way of recognizing expertise.
6) Experience indicates that the certified teachers expand rather than limit the interest of other teachers.

Eighty percent of the states do not have teacher certification in environmental education. Indiana is presently consideration.

The following is the proposal submitted to the Secondary Education Committee, Teacher Education Advisory Council, and the Indiana State Superintendent of Public Instruction.

"It is imperative that the schools accept a large measure of responsibility for transmitting and inculcating into the minds and spirits of the young people they serve an understanding of the natural resources upon which the very life of this nation depends, an understanding of the growing demands made upon these resources by a dynamic culture, and an understanding of the policies and procedures essential for careful and considerate use.

"In developing an effective program for teaching children how to know, how to appreciate, and how to use natural resources with more intelligence, it is imperative that administrators and teachers commit themselves to this purpose, believe that it is possible, give this instruction appropriate priority, assign someone responsibility for seeing that it is done, and give the work in this area of the instructional program appropriate recognition in the evaluation of pupil achievement and the quality of the education program."

The urgency of our environmental crisis, as evidenced by the great concern of scientists and educators across the country, and as expressed by the vast amount of legislation enacted at the state and federal level, would suggest the need for developing and emphasizing environmental education in the public schools. It is imperative that our youth become educated at a time when it is still possible to effect changes in their attitude toward their environment. Therefore, it seems both necessary and timely that we provide teachers with the opportunity for training in environmental conservation of our natural resources, and that we recognize such education through certification.

Certification will provide teachers within our schools the competence to coordinate and integrate conservation and outdoor education into existing programs. Some schools have already instituted a special course in this area at the secondary level. Others plan to do so in the near future.

A teaching curriculum in environmental conservation will also provide a pattern of enrichment for several existing major areas of certification including agriculture, biology, earth science, economics, general sciences, home economics and social studies.

The Endorsement for Coordinator of Environmental Conservation at the Masters Degree level is greatly needed. The teacher completing the School Services Personnel Certificate in this area will be qualified to provide leadership in environmental education for a school corporation. In some situations two or more school corporations may cooperate in the employment of a person as Coordinator of Environmental Conservation to work with teachers from various disciplines in planning and implementing effective programs based on local community needs. A number of State Departments of Education have employed one or more consultants or supervisors in the area of Conservation-Outdoor-Environmental Education. This proposed endorsement should qualify people for this type of position.

Description of Minimum Program
Leading to Qualification for Endorsement on the
Secondary School Teacher Certificate, Provisional

(Minimum of one course to be completed from each of the following groups as indicated)	Teaching minor Sem. Hours	Teaching major Sem. Hours
Introduction to Natural Resources (To include: 1) interrelationships of minerals, air, water, soil, plants, animals, outdoor recreation, and human resources, 2) the relationship of the various disciplines to environmental conservation, and 3) consideration of contemporary environmental problems)	3	3
Biological Sciences (Including ecological relationships)	3-9	3-9
Earth Sciences	3-9	3-9
Physical Sciences	---	3-9
Economics, Political Sciences and Sociology (Including a study of population and demography)	3-9	3-12
Special Resource Areas (To include basic resource areas, outdoor recreation amd resources management)	3-9	3-12
Methods of Teaching Environmental Conservation	3	3
Electives in Environmental Conservation Courses, including Urban and Regional Studies	0-6	0-12
Total	24	40

The School Services Personnel Certificate, Provisional

Endorsement for Coordinator of Environmental Conservation

1. Candidates for endorsement for Coordinator of Environmental Conservation will meet the general requirements for the School Services Personnel Certificate, Provisional.

2. The minimum program for endorsement for Coordinator of Environmental Conservation, qualifying the candidate for the Masters Degree, is as follows:

   a. Experience: Minimum of three years of successful teaching at the elementary, junior high, or secondary level.

   b. Course work; minimum requirements:

      1) The equivalent of an undergraduate minor in environmental conservation. (May include work in this area at the undergraduate level if approved by the candidate's advisor.)

      2) The Elementary School Curriculum, the Junior High School Curriculum, the Secondary School Curriculum. Course work completed at the undergraduate level in these areas may be used toward fulfilling this requirement.

      3) One course in Principles of Supervision.

      4) One course dealing with materials and methods of integrating conservation-outdoor-environmental education into the curriculum.

      5) The Professional Education core for the Master of Arts Degree in Education.

      6) Electives in environmental conservation to strengthen the candidate's competency in this are.

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CEA ORGANIZATION--WHERE DO WE GO FROM HERE?

Dr. Edward Ambry, CEA Board Member

The Conservation Education Association has a relatively long history. The organization grew out of a sympowium on "Education in Conservation" held by the Izaak Walton League in 1944. On April 7, 1945, the League voted to form a Committee on Conservation Education which later became known as the National Committee on Policies in Conservation Education. From this Committee, the CEA was organized at a meeting held at Purdue University in September of 1953.

Dr. Howard Michaud has prepared a document which describes the history and development of the Association, including lists of past officers, conference dates and places, objectives and a list of publications distributed during the early years. The Board of Directors is exploring a plan to publish this document for distribution to the membership.

The organization has had distinguished past. For the present, it is a viable Association with an active Board and a growing membership. It is financially solvent.

In the 1970's, when "change has become a way of life," the Association should assess its progress, re-examine its objectives, compare its relative position with competing and cooperating organizations, take a hard look at its structure, seek advice from members and others, and make some short and long range determinations regarding its future.

With this in mind, the Board scheduled an open meeting to discuss the following concerns. The Board would still be interested in your comments concerning the future of CEA. Your reactions and suggestions should be sent to: Dr. Edward Ambry, CEA, Montclair State College, Upper Montclair, New Jersey 07043.

1. How do we operate - present status --

   A. Membership - numbers, who belongs (agency, institutional, individual members, universities, schools, private organizations, etc.).

   B. Board of Directors organization - membership, number of meetings each year, how elected, constitutional authority and responsibility.

   C. Status of publications - number, distribution, problems, who prepares and edits them, contracts, need for them, which are now available.

   D. Correspondence load.

   E. Services (requested from Board and others).

   F. Competing and cooperating organization (for membership and services) names, objectives - American Nature Study Society, National Association for Environmental Education, etc.

   G. Discussion of "balance point" - not enough numbers to support paid Executive Secretary and central office, but large enough membership to require a variety of services.

   H. Packet service - should it continue?

   I. Finances - income-outgo (average yearly), cost of belonging to Natural Resources Council ($100), Alliance ($250), expenses for Board meetings with explanation that most Board members pay own expenses, cost of running an annual conference, and income (if any), general statements about financial problems and commitments.

   J. Other topics growing out of discussion.

2. What lies ahead - where do we go from here? --

   A. Annual meeting plans, dates, places - (why do we move about the country) - would it be better to establish an annual meeting place in central USA and meet there each year - (benefits) - should we change dates, do we need annual or semi-annual or bi-annual meetings - do we need regional meetings - should meetings be focused on environmental problems (from the standpoint of how we deal with these problems educationally) - should our meetings be combined with other organizations - will the Alliance plan large meeting with sub-group meetings.

   B. Constitution - is it out-of-date - does it need revision - who does this work - what purpose does it have.

   C. Resolutions passed by organization - what effect do they have - who follows up.

   D. Membership - do we need a vital effort - who competes for membership - student membership - do we want a stronger teacher membership - how can we accomplish this - should we consider NEA affiliate - what services are required - do we want joint membership with similar organizations - should we retain independence - fee revision - regional arrangements - is there a new way of organizing ourselves to be more effective - stress competition or cooperation - benefits of membership.

   E. Publications - should we revise, go out of business - do we make a profit - who is invited to submit text - should we continue the keys - should we produce one a year (yearbook devoted to current issue such as energy

crisis, population problems, etc.) - could this major yearbook problem be the theme for the entire year (including the annual conference), could such a yearbook emerge from the annual conference.

F. Organizational purpose - should we be dealing with environmental issues or limit our efforts to the educational problem areas associated with overall issues - has our basic philosophy changed - do we need new statements of purpose and goals - should we consider national/international issues.

G. Name change - are we ready to open up this question again - how - means - results of recent questionnaire.

H. Alliance - why we took leadership - cost to whom - status - will it be effective.

I. Historical documents and important organization papers - scattered across the country - do we make an attempt to centralize - cost - who does it - is it important to do it - who has the time or knowhow.

J. Board of Directors - how many meetings - correspondence loads - cost - schedule - frustrations - too large, too small - regional representation - authority.

K. Process of interface between Board and members - techniques - once a year - feed-back from membership - difficulties in securing feed-back - are there new tools for achieving open dialogue - how do more members "get involved."

L. Future - are we at a point in time where the organization "chalks up its contributions" and encourages others to go ahead, taking credit for a job well done - is there a <u>real</u> purpose to continuation - who would serve the needs of members if such a conclusion was reached.

M. Other topics growing out of the discussion.

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FROM SOLID WASTE TO ENERGY

Ed Wisely, Vice President, Horner and Shiffrin, Mayfield, Kentucky

In April, 1972, for the first time in the United States, and perhaps for the first time in the world, an investor-owned utility began to burn municipal solid waste as fuel for the direct production of electric power. This unique venture is a cooperative effort between the City of St. Louis, Missouri, and the Union Electric Company, with financial support from the Environmental Protection Agency. It is intended to demonstrate the benefits which could accrue to a metropolitan area by utilizing this technique for solid waste management and the recovery of resources. The potential benefits include an environmentally acceptable means of solid waste disposal, conservation of irreplaceable natural resources, more effective control of land use, and economic advantages to both the utility and the public.

Until recently, efforts to recover energy from solid wastes have been somewhat of a rarity in the United States. When such efforts have been made, they have generally been confined to the generation of steam, for either inplant use or for sale. Unfortunately, such steam generators must be quite sophisticated and are correspondingly costly, and in order to be effective in resource recovery, must have markets for the steam they are designed to produce. Satisfactory markets for steam are not always readily available.

Consider, however, large, efficient, existing utility power plants, already integral with systems for producing, distributing and marketing electricity. It follows that if a means were devised to burn refuse as fuel in existing power plant boilers, without creating significant adverse effects, the matter of finding a market for the energy available from refuse automatically would be resolved, since utilities can market essentially all of the power they have the capability of producing.

The St. Louis project was conceived under the premises that if residential solid waste were property prepared, and if it were to replace only a small percentage of the fuel fired to coal-fired boilers, the effects would be little, if any, different than if the fuel were entirely coal. Although coal-fired boilers are not without operating problems of their own, a comprehensive study concluded that such problems would not be significantly increased, if increased at all, by burning prepared refuse as supplementary fuel. This concept was found attractive enough for the Union Electric Company to offer the use of two of its major power-producing boiler units for full-scale tests, and to contribute a substantial sum toward the installation of facilities to implement these tests.

At the present time, the solid wastes being processed for use as fuel consist of mixed municipal refuse generated in residential areas. No bulky materials, such as appliances, furniture or significant quantities of automobile tires, or industrial and commercial wastes, presently are being processed. However, certain selected industrial and commercial wastes may be processed later.

The relative economics of utilizing refuse as supplementary fuel show promise of being attractive. The basic economic elements consist of: (1) the total unit cost of processing, transporting and firing the refuse, including those costs accruing to the utility; (2) the costs of alternate means of residential solid waste disposal; (3) the value of the magnetic metals and other materials which potentially can be recovered from the nonburnable fraction; and (4) the value of the milled refuse as a replacement for the normal fossil fuel. Under almost any situation, the capital cost of the facilities required for application of the process would be substantially less than that of conventional incineration facilities. Total unit costs per ton, including operation, maintenance and amortization, could be comparable to those of sanitary landfill when the landfill is in a location remote from the point of refuse generation.

Utility fuel costs are rising rapidly, but even under present conditions the value of refuse as fuel could be significant. When all of the economic elements are considered, the cost of residential solid waste disposal by this means could be highly attractive in many of the metropolitan areas of the United States.

Present indications are that almost all fossil fuel-fired boilers, providing they have ash handling capability, could be adapted for burning refuse. Some, of course, could be more easily adapted than others. There also appears to be no reasons why the combination burning of refuse with gas or oil, as well as with coal, would not be practical.

The capability of existing suspension-fired boilers to consume municipal solid waste is great enough to permit the process to serve as a principal means of refuse disposal for many metropolitan areas, even when the supplementary fuel is fired as only 10 percent of the total fuel requirements. A 600 megawatt unit, for example, could at full load consume on the order of 1,400 tons of prepared solid waste per day at the 10 percent fuel replacement.

The process shows promise of having fairly extensive application once a satisfactory cooperative arrangement can be worked out between the utility and the solid waste supplier. It could provide an economical means of disposing of large quantities of solid wastes in an environmentally acceptable manner, effect recycling by the direct recovery of electrical energy, conserve irreplaceable natural resources, and to some degree, assist in the control of air pollution. Indications are that these benefits could be achieved by merely achieving cooperation between municipalities and utilities, by using commercially available equipment, and by applying already tried and proven technology.

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GOVERNMENT'S ROLE IN DISPOSAL OF COMMUNITY WASTE

Dr. F. E. Gartrell, Tennessee Valley Authority, Chattanooga, Tennessee

The constant increase in per capita production of refuse, coupled with population growth and concentration in the urban areas, is a major consideration in management of solid wastes. The size of the problem, as well as the practices or lack of practices used in its solution, is responsible for the nation's crisis in solid waste management.

The term solid waste describes that material which is normally solid, and which arises from animal or human life and activities and is discarded as useless or unwanted. Solid waste also includes deposited waste particulates, even when temporarily suspended in air or water. It refers to the heterogeneous mass of throwaways from the urban community as well as the more homogeneous accumulations of agricultural, industrial, and mineral wastes.

The various public statements in the past, whether expressed in tons of solid wastes or in dollars of expenditure, have usually been limited to the quantities of wastes for which municipalities have been responsible or represent an estimate of gross municipal costs. It is estimated that almost one and one-half billion pounds of urban solid wastes are generated in the nation each day and that costs of community collection and disposal approximate $4 billion per year.

The traditional view of solid wastes, including urban garbage and rubbish, augmented by quantities of abandoned vehicles, demolition-construction wastes and various other items, requires some re-examination. There is more to the problem than just handling and disposing of community or urban solid wastes, despite the fact that even this one aspect of the problem is far from solution. Congress directed attention to the overall solid waste problem in the Solid Waste Disposal Act of 1965 which defined solid wastes as "garbage, refuse, and other discarded materials, including solid waste materials resulting from industrial, commercial and agricultural operations, and from community activities." Disposal was also broadly defined to include "the collection, storage, treatment, utilization, processing or final disposal of solid waste."

The earth's mineral and other resources are not unlimited. Man extracts metals from ores and transforms other materials from a natural state to manmade products, but when these products have fulfilled their usefulness, and are classified as solid wastes, the valuable and nonrenewable materials are often lost. Iron, for example, is a nonrenewable resource concentrated in ores over periods involving millions of years of geological processes. This element is extracted, processed, and widely dispersed over the earth to serve many useful purposes, from cans to automobiles. When discarded, these objects rust away and that amount of iron may never be available again for use by future generations. Shortages in resources for some of the less common elements have been created already by many indiscriminate waste disposal practices.

A prime solution to the resource depletion problem created by profligate use of metals and other elements would be to improve methods for recycling and reuse. To some extent, the salvage industry has traditionally served this purpose, but the concept might well be more widely applied. It is not inconceivable that present-day tailings dumps, landfills, and automobile graveyards may be looked upon in the future as "mines" for minerals whose natural ores have been depleted, or that remain only in deposits which can be mined only at greater cost than required for recycling of wastes.

Implicit in public attitudes toward waste materials is the problem of economics. National concern must transcend both the concept of what the public can "aford" to pay and the question of why the expenditure of about $4 billion each year for solid waste collection and disposal has not staved off the present mounting problems with solid wastes. The truth is that the national standard of living depends to a significant degree upon processes leading to waste generation. It is reasonable to presume that a departure from traditional wastefulness of resources might reduce the volume of wastes to be managed. Thus, there is a need for finding ways in which wastes themselves may be salvaged, reworked, and recycled back as a part of resources that are being processed.

A system for managing solid wastes must be economically as well as technologically feasible. In waste management, as in many other fields, a particular facility or item of equipment may be technically suitable, but prohibitively expensive. Many communities are unable or unwilling to pay the price necessary to take advantage of presently available solid waste disposal devices. In general, only the larger cities find incineration economically feasible and incineration may become even more costly as legislation requires increased investment in equipment to meet air quality standards. Several compost plants have been constructed for processing municipal solid wastes; some have failed, largely because there had been no clear market potential for the finished product. As competition grows for the remaining open space in cities and suburban areas, land for sanitary landfills is becoming increasingly scarce, and this disposal method for municipal solid wastes, therefore, is becoming increasingly expensive.

Location and quality of operation of solid wastes disposal facilities may have an important impact upon the economics of an area, affecting land use patterns and the value of surrounding property. Although incinerators, sanitary landfills, and compost plants generally do not enhance the value of surrounding property, there are isolated examples in Southern California and other areas in which expensive residential neighborhoods are found adjacent to sanitary landfill sites, planning for ultimate conversion to parks, golf links, and other recreational uses. Three-quarters of the $4 billion yearly cost of U. S. solid waste disposal is attributed to the collection and transport of solid wastes. Yet this expenditure has purchased only hit-or-miss collection systems with little satisfaction for the majority of American communities. The one-quarter of expenditures currently allocated for processing and disposal of wastes has, despite obvious public objections, resulted in the use of the open dump as the predominant disposal method.

It is apparent that even more money must be devoted to improving management of solid wastes, or improvements must be introduced to the present system while achieving economic efficiencies, or both. Clearly, comprehensive solid waste management is a legitimate and necessary expense of living, a fact not yet appreciated by the public.

The problems of waste management are greatly influenced by industrial technology and market considerations. Planned obsolescence, for example, is a way of life in the production and sales of some consumer goods industries. The consumer is urged to buy the new and trade in or throw away the old. The rise of the nonreturnable container, in spite of the fact that it costs the user more than the old type, is another illustration of the close relationship between market strategy and the generation of solid waste. In spite of the fact that industrial technology and market incentives result in more goods and a higher rate of solid waste production, little current thought is being devoted to the true disposability of the product. With the exception of the new biodegradable detergents introduced since 1965 and current efforts in the field of pesticides, there is virtually no instance in which product design consideration has included that of ultimate disposability. "Disposability" has been interpreted only in terms of user convenience--a convenience characterized by single-service discarability. Markedly absent have been objectives of reusability and ease of ultimate disposal.

Cities throughout the world have traditionally dealt with wastes by transporting them beyond their own immediate confines and discarding them in the least expensive way the public might tolerate. No serious problems arose from this practice as long as cities or jurisdictions were separated by space occupied only sparsely by human beings.

But today, urban sprawl is erasing space between cities. A major obstacle to organizing efficient high-quality metropolitan refuse collection and disposal systems is the multitude of local governmental units, many of which are remnants from another era. These local political subdivisions may be separated by natural boundaries such as lakes, rivers, mountains, by the political boundaries of satellite communities that surround an inner city, or by state boundaries.

Improved solid waste management is impeded by the failure by many communities, particularly the smaller ones, to combine their efforts and financial resources for collection and disposal. Certain efficiencies--economies of scale--can be realized with optimum unit size. Without cooperation, communities may not be able to afford the equipment and qualified personnel necessary for adequate solid waste management, or they may not be able to use what is, from a technical viewpoint, the most desirable disposal site.

Areawide refuse disposal service is being provided in a few metropolitan areas by special purpose districts, by counties, or by cooperative agreements between cities and other local political subdivisions. The economy-of-scale advantage of such areawise disposal service not only reduces unit costs, but also makes it possible to operate on a more sanitary and acceptable basis and to avoid needless duplication of investment.

This regional approach to solid waste management usually provides the answer to the problem even when a region includes inter-state areas. Failure to take the regional approach may be a matter of local pride or inertia; there may be legal barriers to interjurisdictional cooperation. In either case there is need for more realistic legislation or administrative response.

An important factor in effective solid waste management is operational planning. Even though collection and disposal of solid wastes remains an undeniable community need, in some cities and communities the need is not considered in basic community facility planning. Like other public services, solid waste management is related to population growth, density, and industrial and commercial zoning. Land is required. Planning calls for a long-range look at the total area involved. Communities are inclined to conceive of solid waste collection and disposal activities in terms of how to deal with community refuse for the next few years. Communities might best consider and act in terms of what must be done to meet the total area needs for 25 to 50 or even 100 years.

Perhaps the basic political fact of solid waste management is citizen response to factors and solutions regarding solid waste problems. The citizen, together with municipal administrators and industrial executives who are deeply involved in finding solutions to the solid waste problems, must be made aware of the need for a new concept of solid waste management. The Solid Waste Disposal Act of 1965 has accelerated the pace of solid waste technology and

research; past and present technological information related to solid wastes is being accumulated on a more consistent and thorough basis; people with varied skills and from many disciplines are seeking to solve the problems caused by the ever-increasing quantities of solid wastes from many sources.

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INFORMATION ANALYSIS AND DISSEMINATION IN ENVIRONMENTAL EDUCATION

Dr. Robert Roth, Ohio State University

ERIC, Educational Resources Information Center, was conceived in the U. S. Office of Education in the mid-1960's as a system for providing ready access to educational literature.

Because of the decentralized nature of American education, its many specializations, and the existence of numerous professional organizations, ERIC's designers opted for a network of organizations rather than a single monolithic information center located in Washington. ERIC was conceived as a network of "clearing houses" located across the country in "host" organizations that were already naturally strong in the field of education.

Contracts with clearing houses originally gave them responsibility for acquiring and selecting all documents in their area and for processing these documents. With their specialized subject expertise, clearing house staff are well qualified to manage ERIC document selection functions. In order to generate products that included the output of all network components, information gathered by clearing houses had to be assembled at one central place. ERIC's final design included decentralized clearing house operations integrated around a central computerized facility which serves as a switching center for the network. The data recorded by each of the clearing houses is sent to the facility to form a central data base from which publications and indexes are produced.

Similar arrangements are used to supply the public with copies of reports added to the system. A basic decision for ERIC was to make documents available from a central source instead of just informing users that a given document existed. It was necessary to provide a document reproduction service where any noncopyrighted document could be obtained. ERIC was developed as a complete document announcement and retrieval service.

There are currently over 500 organizations that subscribe to the ERIC collection on a continuing basis. These are made up of Federal agencies, universities, state and local education agencies, school systems, professional associations and nonprofit groups. For further information contact ERIC, 400 Lincoln Tower, Ohio State University, Columbus, Ohio 43210.

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USA's FIRST ECOLOGY JUDGE

Judge William Walden

Pollution and the deterioration of our environment have created some of the most pressing problems facing us today. To counteract these problems, The Ecology Court, a new judicial concept has been enacted in Jefferson County, Kentucky.

In order to effectively and equitably dispense justice in the field of ecology, a proper forum is essential. Ecology Court is that forum. Governmental agencies and enforcement officers bring violators before it for litigation and citizens can have summons warrants issued for the violations that they witness. Ecology Court handles all complaints registered by local citizens relating to environmental matters. The Court focuses special attention on air and water pollution, in addition to land littering and public nuisances.

In order to encourage the citizenry to participate, Jefferson County Government has authorized a reward of up to $25 for each citizen whose complaint against a polluter results in conviction. To register a complaint, the citizen files a signed affidavit against the offender and states the offense which was allegedly committed.

Following this, the accused polluter is summoned before the court within 10 days for trial. If found guilty, the court may assess fines up to $500, depending upon the gravity of the offense.

In addition to citizen participation, City-County Health Board agents and Air Pollution Control Board inspectors cite many offenders for burning of trash and auto exhaust violations.

The Court was designed as a public service to act primarily as a deterrent to polluters rather than as an administrator of punishment. The Court is not inhibited by the size of the polluter. It hears cases ranging from multi-million dollar corporations to backyard fires.

During the first year 940 cases were brought before the Court, only 12 have been dismissed and fines totaling $17,800 have been levied.

Ecology Court is serving the community through building a judicial body of procedure and precedent. In addition, it is saving enforcement inspectors time by concentrated court appearances, reducing the amount of time spent in court, and thus increasing the period of time the inspectors can spend in the field.

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TWLEVE MAJOR ENVIRONMENTAL CONCEPTS--A RATIONALE

Robert J. Warpinski, Project I-C-E, Green Bay, Wisconsin

Concept 1. Energy from the sun, the basic source of all energy is converted through plant photosynthesis into a form that all living things can use for life processes.

When we turn on an electric light switch, we may be able to mentally trace the source of this useful energy back to a generating station. We may even know that in most cases the energy comes by releasing the energy stored in fossil fuels. Very few of us conceive of the hydrogen bomb reaction of the sun as being the ultimate source of our electrical energy. Yet this sun, radiating light energy, is the energy we need for body operation. Only the green plant can trap and store this energy. When light energy strikes the green plant the simple common compounds of water and carbon dioxide are transformed into an energy rich storage product, sugar. Some of the sugar undergoes transformation over geological time to energy storage products we can fossil fuels. Whether we use this energy stored by the green plant when eating plant products, when eating animals fed on plant products or when burning fossil fuels, we release this energy by using oxygen produced by the plant during sugar manufacture. We thus free carbon dioxide and water to recycle through the energy storage cycle to keep life systems operating.

Concept 2. All living systems interact among themselves and their environment, forming an intricate unit called an ecosystem.

We have seen in concept one that there is a dependency on the green plant for the operation of the energy cycle of life. But the green plant does not operate independently. It is dependent on the physical and biotic world in which it lives. Plants as food energy producers, animals as energy consumers and decay organisms recycling organic matter for plant use--all form part of a complex interacting biotic community. These organisms are specially adapted to living with each other within a physical realm which is itself a complex of interacting factors such as soil, climate, available light, season, water and oxygen supply. Each biotic community type is different because its surroundings and physical factors vary. In addition, each community has its own influence on the physical surroundings. This creates a feedback situation known as the dynamic balance of nature. Constant change is part of the whole system. We call this complex of life and physical factors and their interactions an ecosystem.

Concept 3. Environmental factors are limiting on the number of organisms living within their influence, thus each environment has a carrying capacity.

Recent space adventures have made us aware that our astronauts are dependent on a life support system which must be finely planned and engineered to achieve a safe and successful space voyage. We on earth live in a similar life support system. Because we have not yet treated this spaceship, Earth, with the foresight in planning that is done for space travelers, we may be pushing this system to the limits of its resistance. Each environmental factor is a strand in the web of life and when a strand breaks because pressure on it exceeds its capacity, the whole web is weakened and may break down. The best measure of the strength of an environmental strand is the one that will limit the density of the population. We can destroy life's web by increasing population beyond the capacity of the limiting factors; for example, by overgrazing a pasture. Also, we can change the resistance within life's web by altering the environmental structure as we do in polluting water.

Concept 4. An adequate supply of pure water is essential to life.

No life of which we know functions without water. Even a virus, basically a super molecule, is active only in the atery environment of living tissue. Each organism has adaptations for life in an environment that includes a certain water quantity and quality. The varied concentrations of wastes pouring from our industries and sewers change water quality so that native organisms are eliminated. Some of the new industrial compounds poured out are so strange that no organisms can adjust. Man has changed the supply and quality of water in many areas without consideration for the quality of the biotic communities dependent on these waters. He even goes on changing water quality when it is of detriment to his own use of this water.

Concept 5. An adequate supply of clean air is essential for life.

Some of our commercially most useful organisms, the yeasts, can exist without air. In fact, as obligate anaerobes, they must carry on their active life processes in the absence of oxygen. But even these anomolous organisms depend on the energy laden organic molecules such as the sugars produced by oxygen respiring green plants. The green plant carries on respiration even as it photosynthesizes an excess of oxygen for animal respiration. Both plant and animal respiratory systems have evolved in an atmospheric condition predating man's inventions. We now see the damage to plant and animal communities resulting from industrial and automotive funes and smogs. Some organisms are more sensitive to changes in air quality as seen in the death of the Ponderosa Pine in the mountains near Los Angeles. Our concern is not only with the lethal effects to sensitive organisms or to more tolerant organisms under disaster conditions, but also with the long term, low level toxicity which is cumulative to organisms such as man because of the changes our industrial culture has on air quality.

Concept 6. Natural resources are not equally distributed over the earth or over time, and greatly affect the geographic conditions and quality of life.

Before man's culture entered into the progression of life's history, climate, land form and mineral locations presented environmental conditions that only certain plant communities and their animal associates could tolerate and to which they could adapt. The geologic activities of erosion and mountain uplife have changed the land forms over

time. Thus, plant communities were not always associated with the locations where man found them. Man is a most adaptable organism. His cultures have reached all regions of the earth, but until recent times even this has been by genetic adaptation to environmental conditions. Now as industrial man seeks to extract resources for his economic machine he must trade with people of other regions. Historically, the extraction of resources has often left the populations of those regions poorer as the extracting nations have been enriched. Even industrial man, with his capacity to modify the environment, is confounded when he moves to a pleasant place of living like California. He finds that he has overloaded the capacity of the region to absorb his wastes because of the special local distribution of land form as in the Los Angeles Basin.

Concept 7. Factors such as facilitating transportation, economic conditions, population growth, and increased leisure time have a great influence on changes in land use and centers of population density.

Consider two small settlements connected with the fur trade, one on Rock Island in Door County and the other at present day Chicago as they were several centuries ago. What makes these two sites so vastly different today? We see one located where the lake carrier, the railroad, the truck, the river barge and the airplane can bring and exchange goods from near and far. Having easily available the raw materials of agricultural produce, fuel, and ore and being close to the heartland of the agricultural market meant that a profitable manufactury could develop. Financial houses grew to provide the capital funds industry needed. The city fueled its own growth as early expansion increased the demand for services. As urban growth changes the natural site appearance, the urban man seeks to use his increased free time affluence and to return where he can linger in the rustic atmosphere his industry erased. Now this man invades the remote island, presently a part, to sample a way of life he cannot permit to remain where he carries on the activity of economic man.

Concept 8. Cultural, economic, social, and political factors determine the status of man's values and attitudes toward his environment.

Erich Fromm says of western and particularly of North American man: "Man has lost his central place...he has been made an instrument for the purpose of economic aims...he has been estranged from and has lost the concrete relatedness to his fellow men and to nature...he has ceased to have a meaningful life." We have come to live in a material, market oriented society which is conditioned to value things above life and person. Man has created the machine and is now owned by his own creation. Our advertising causes us to search out in satisfaction of artificially created fantasies. The economic system that benefits from satisfying our consumer demands has its own demands on the resource base. The political system is cemented to economics because it measures national health in terms of Gross National Product. It also set out attitude to the land in the sense that our public lands were considered wild things waiting to be reduced to dominion. The Myth of Superabundance saturated our whole outlook. In one sense we do see ourselves as central to all creation. We believe it is our duty to do and conquer nature which has its existence only to satisfy our demands. How different this is from the Indian culture that demanded an individual apologize to the spirit of any being or place which he needed to use for satisfaction of necessary human activity.

Concept 9. Man has the ability to manage, manipulate, and change his environment.

As man has advanced in cultural sophistication from the food gathering and hunting/fishing cultures still retained by some few people we refer to as aboriginal, his ability to change the environment has increased. Today we possess the unwanted capacity to destroy most life directly with the terrible power of atomic force. We are in awe of this terrible power. We are also becoming aware that a less dramatic destruction goes on under our command as we mindlessly pursue the "conquest of nature." We extract the plant resources, the life giving capacities of the soil, the mineral and fuel deposits. We fill the waters with foul wastes, the marshes without used foods, the air with contaminants and the land itself with the artifacts of progress. We should not forget, however, that man also has the power, when possessed of wisdom, to wisely manage the land, to use his knowledge of the ways of natural systems for maintaining his artificial systems in balance with those systems for maintaining his artificial systems in balance with those systems.

Concept 10. Short-term economic gains may produce long-term environmental losses.

In Governing Nature, E. F. Murphy states: "If it means the return of a profit, North Americans have changed even the most hostile landscapes in order to make them serve current economic demands." Market oriented entrepreneurs seeking to maximize profit have traditionally operated with relatively short-term outlooks. We all see the future productivity of the land. We operate with a faith in the myth of scientific supremacy which suggests that technology will atone for our abuse of the land. There are long-term environmental and social costs to be paid when we consider environmental factors as unimportant and aid, water and land as "free goods." These costs must be paid. Even now we pay them as we find environmental quality decreasing and our social problems on the increase.

Concept 11. Individual acts, duplicated or compounded, produce significant environmental alterations over time.

Adam Smith in The Wealth of Nations conceived the idea of "the invisible hand." He said that it was largely the individual merchant, intent on his own gain, who in the aggregate directs the availability of goods to meet the demands of a market economy. This same invisible hand in the form of individual consumer decisions, guided by competitive prices and product availability, directs manufacturers to draw on the resources of nature to supply the market. Each supplier's decision to ignore the costs of maintaining environmental quality, so better to compete on the price schedule, has added to the present environmental damage. The individual consumer, making decisions to buy, to dispose of consumed goods, to participate in political action for environmental causes has a great degree of control over further destruction to the land. If the aggregate of individuals love and respect the land as mother earth, these decisions will combine to solve present environmental problems and prevent more damage to earth's environment.

Concept 12. Private ownership must be regarded as a stewardship and should not encroach upon or violate the right of others.

Our Indian ancestors held that the land belonged to "the people." An individual could hold land during his lifetime, but he was to treat it as the mother spirit which nourished the people from ages past and would do so in the far distant future. We, too, are charged with being custodians of creation, and are held responsible for the wise use of creation's bounties. If we consider ourselves masters of the earth, yet destroy the environment, then we are out of control, being not masters but slaves. In his Sand County Almanac, Aldo Leopold found the custodianship concept an ecological necessity. Individual man is part of the community of nature, interdependent with this community. The community of the land is the life support system for all including man. Leopold asks how a man might be considered a respected member of the human community when he commits crime of abuse against the land. We should have our social consciousness extended to a concern not only for the relationships within the human community but also for the relationships between man and the total community of life. This Leopold calls the Land Ethic.

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LAND USE AND LAND PRIORITIES

Walter Jeske, U. S. Department of Agriculture, Washington, D. C.

As the new wave of concern for the condition of our natural environment began to gather momentum several years ago, few people paused long enough to sort out the basic or highly significant environmental problems from those having less serious consequences. Environmental degradation caused by the ubiquitous habit of humans to toss trash and litter anywhere was given the same serious regard as the unhealthy and vile condition of our streams, rivers and lakes. To attract an audience, it was necessary only to scream that man was fouling his nest and then point to some example of an environmental nuisance or almost any activity that changed the status quo of an ecosystem.

Eminent scientists as well as uninformed individuals almost daily shouted warnings that continued human existence could be measured in years if we did not radically change the profligate ways we were using our planet's resources and stop poisoning various links in our life support system. Cassandras of the catacylsmic have been with us for throughout the ages, of course, and, in the current decade, their doomsday predictions about ecological disaster have heightened the general public's sensitivity to environmental quality.

But all threats to environmental quality are not equally grave. Serious as they are, the problems of air and water pollution are not beyond solution. Hard work, use and development of appropriate technology, and commitment to pay the price can and are correcting part of the mistakes. When we buy a new car, pay our electrical utility bill, or purchase any of a host of products or services, we're all beginning to get an inkling of the cost of cleaning up our air and water resources. But we are alleviating the pollution of air and water.

However, the damage done is well-nigh irreversible when productive land is paved over, when an airport is constructed too close to a densely populated area, when a highway usurps scarce parkland within a community, when a housing development is built on a floodplain, or when an estuarine area is filled. That message about land use decisions and actions--not only their general irreversibility but their importance as determinants of quality levels for other elements of the environment--has gotten through to leaders and legislators.

The now two-year old United States National Report prepared for the United Nations Stockholm Conference on the Human Environment puts the land use problem in perspective this way: "High on the list of priority issues in the need to establish land use policies for urban and rural areas alike--not just for isolated areas of critical concern but on a global basis. For the quality of our environment--indeed of life itself--is land dependent. No other segment of the human environment deserves more grave consideration than this fragile crust of soil from which we derive our sustenance."

The 1972 Report of the Citizens Advisory Committee on Environmental Quality emphasizes the critical relationship between environmental quality and land use this way: "Of all the factors that determine the quality of our environment, the most fundamental is the use we make of our land."

And Russell Train, then chairman of the Council on Environmental Quality, declared on February 19 in a speech at the American Outdoorsman Conference: "Land use is the number one environmental problem facing the nation today. The problems of land use are rapidly reaching crisis proportions. There is no environmental problem more serious than our land use dilemma."

Now that land use is being recognized as a significant environmental problem and citizens are beginning to discover that choices among alternative solutions to pollution problems and use and management of natural resources usually are tied to land use choices, we can expect a deluge of written, visual and oral presentations on the subject.

Land in our country is influenced and controlled by public policies. Most of our land is privately owned, but government does have extensive powers over use of it. First, there is the general welfare clause of the Constitution from which is derived the power of eminent domain--the power to take private land needed for public purposes, such as highways, slum clearance and park additions. This power is important, not because the area of land so taken is large but because of the strategic nature of the lands and the coercive nature of this power. A second basic governmental power over land derives from the police power of government, such as zoning ordinances, subdivision regulations, building and health codes.

A third basic governmental power over land is that of taxation. Some assessments are made explicitly for keeping land in certain uses. The fourth, and probably most important basic power over land is that of the power of the purse--how and where public funds are spent for various public purposes.

At this point we do not have a coordinated national land use policy law. Such an act is now being considered by the House Committee, which would authorize federal assistance to encourage states to protect lands of critical environmental concern and to regulate siting facilities such as airports, highways, and key private facilities like housing developments.

Even without a written, comprehensive land use policy, knowledgeable people can see, understand, and agree that there is need for a community to set forth some rules that encourage proper use and care of natural resources and that prevent some of the community's members from damaging the life support system upon which all depend or the common resources which all value. Examples of regulation include flood plain ordinances, land use zoning, sanitary landfill regulations, sediment control laws and ordinances, and the like. States and their units of government have enacted some specific land use regulations; for example, the Warrenton-Dune Soil Conservation District in Oregon enacted a land use regulation for the care, treatment and operation of certain zones (sand dune areas) in their conservation district in 1948. That land use regulation has continued in effect and is credited with helping preserve an important, fragile environment.

As people become more socially conscious, more of them ask questions such as "Shouldn't private land be subject to more control for public benefit?" "Should we permit runoff from one man's land to carry sediment on to his neighbors?" "Should we allow a landowner to keep his land in trees and use it only for recreation if there is a need for that land to produce grain or other products?" Considering the high price of lumber today, many of you who came by auto to this meeting might well be asking if there should be some kind of regulation to make owners of small woodlands use improved timber management practices. We all saw hundreds of wooded acres that were poorly managed and we do need lumber for homes. This whole question of private versus public control is a most difficult one. In considering it, we need to remember that the Constitution reserves to the states the authority to regulate private land.

Only by the right of eminent domain and the police power can the federal government take private land or regulate its use. Some people think that state and local governments have failed in their stewardship or private lands and they recommend amending the Constitution so that the federal government can regulate private land use for the public benefit.

There is, of course, an opposing force in the commonly-held opinion that government is already too large and should be delegated to local authorities or returned to the individual. There is even a strong reaction against state governments. Certainly because of the differing natural resources and historical backgrounds of different parts of the U. S., uniform national laws on land use would cause a great upheaval and conflict. Considering the strong common law emphasis on private property rights, and the need for understanding local customs and condition even state regulation will not be easy.

Workable land-use regulations derive from careful land-use planning. The architecture of land-use plans must take account of national, regional, state, and local resources, needs and goals. These plans and regulations must be formulated and administered locally by a responsible and enlightened citizenry, or they will not be effective in achieving the economic and social objectives for which they were created.

Some political scientists and economists have raised the issue for many decades as to whether the landowner is entitled to unearned increments of land value resulting from the accident of location and of local economic development. Traditionally he does have this right, and this is how some people have become wealthy. This is why some people get so excited about changes in local land use. For example, most of us would object vigorously if someone tried to put a low-cost housing project in our neighborhood because we are sure that property values would decline. We ordinarily do not object if a new university or a nice clean factory moves in and local land and house prices rise. But it's more complicated when we talk about preserving prime and unique lands for crop production and other uses. If we say that land in central Illinois should be kept in farming and that land should not be taken for a nuclear power plant or for new suburban communities, then we are saying that the present farm owner is not going to have the capital gain that he could have if he sold his farm to a developer. One of the most difficult questions we shall have to answer is whether we want to continue this practice or whether we want to institute restraints that will protect the long-term public interest.

One of the most difficult questions of all is, what should be the national policy in respect to economic growth and development? Economists and politicians alike are wedded to the idea that the economic growth rate is the only proper measure of the economic health of our country. In contrast, environmentalists say that continued economic growth carries the inevitable impact of increasing pollution and a decline in the quality of the places where we work, live and play. Economic growth means more rapid depletion of fixed resources and it means more waste products.

Do we really need to increase economic productivity or have we gone far enough down that road? Can we be satisfied with present standards of living and focus our attention on improving the quality of natural and urban environments rather than on economic growth?

We can appreciate that land use planning is a complex, but more importantly, a continuing process. It must involve to the fullest extent possible, the people affected by the planning and it must meet their needs and objectives.

* * * * *

TRAINING PROGRAM FOR PARA-PROFESSIONALS IN ENVIRONMENTAL TECHNOLOGY

Wayne Hewell, Christian County Vocational School, Hopkinsville, Kentucky

The environmental vocational school at Hopkinsville, Kentucky, was the first of its kind in the country. The school draws its students from the unemployed or underemployed with the equivalent of a high school education. The student spends approximately two thousand hours divided among classroom instruction, visitation of plants and facilities pertinent to the unit being studied and on-the-job training.

Part of their study includes air pollution, water pollution, water and sewage treatment methods, soil conservation and water districts.

During the three years the program has been in existence, the school has had fifty enrolled, thirty-four completions, sixteen drop-outs and twenty-four employed. This means an employment rate of 71 percent. Employment has been with many different organizations; such as water treatment, water pollution, sewage treatment, highway department, surveying, County Health Department, distillery yeast preparation, quality control laboratory and diagnostic laboratories. Starting salaries have ranged from $350 to more than $900 per month.

One of the values of such a program is to improve young people in their ability to gain employment and enrich their lives through knowledge of their ability to do a job well.

* * * * *

ARCHITECTURE AND ENVIRONMENTAL EDUCATION

Thomas Worden, Tennessee Valley Authority, Knoxville, Tennessee
Dan Young, Ball State University, Muncie, Indiana
Herb Burns, Housing Aid Corporation, Lexington, Kentucky

There is a need to develop an environmental ethic in people. Program, site and budget must be considered in designing community projects and subdivisions. Specialists such as land planners and designers are needed. The use of a master land use plan is essential in determining size of site, access, availability of utilities and specialized characteristics of the area. Revitalizing old towns is a costly problem, as is getting acquisition and control of land. The varied segments of a town and its people must be considered and used in planning.

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WORLD ENVIRONMENT - OPPORTUNITY TO LEARN THROUGH TRAVEL

Standord Hendrickson, Murray State University

Dr. Hendrickson spoke of his travels around many parts of the world, and how deeply impressed he was by the social customs and land use methods which differed so much between the various people he visited. "Social geography" rather than the usual "physical geography and place locations" was stressed. From his vast collection of slides, Dr. Hendrickson delighted his audience with a casual running narration of strange peoples and beautiful areas. Scenic shots, close-ups of flowers, vegetables, and individuals, and distant panorama pictures all emphasized the social differences between peoples in different lands. Land use practices varied from modern tractors to the age-old use of oxen to turn the soil; marketing trucks, and walking with produce carried on one's head to the small local market; floating vegetable gardens and terraced hillsides; rugged mountains and fertile valleys; rubber tree plantations, flooded rice paddies, hillside farming, bare-subsistence soils, and exotic flower fields.

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AN OVERVIEW OF AN ENVIRONMENTAL EDUCATION WORKSHOP USFS

U. S. Forest SErvice Workshop Team

This program, designed and perfected by the U. S. Forest Service, has been presented throughout the country by a national environmental education team. The Process Approach to Environmental Education provides educators from all subject areas and grade levels to initiate a meaningful environmental program in their school or community.

The program involves problem solving, field investigations, simulation games, lesson plan development, techniques of group involvement, and strategies for developing an EE Advisory Committee, EE workshops, EE learning areas and EE curriculums.

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ENVIRONMENTAL EDUCATION--BUREAU OF SPORT FISHERIES AND WILDLIFE

Peggy Charles, Ed Landin, Bob Personius

The Federal Bureau of Sport Fisheries and Wildlife, which manages the upper two-thirds of the Horicon Marsh, wants to share its resources of land, people and experience with teachers and students by encouraging environmental education in local school systems around the marsh. Our job is not to teach, but to help make our resources available to those who can.

When we speak of environmental education, we are talking about a style of teaching--a system of methods for involving students in learning situations that will help them to think reasonably and understandably about their environment.

Teachers themselves do not have to be experts on the subject matter in order to lead successful learning experiences in EE. Through a discovery and investigations approach, a teacher who is as curious and open to his environment as his students will not only have no trouble captivating students' interest, but will often help them to get a better "feel" for problem-solving when they search for an answer along with their students.

There are many areas in the marsh that are open to class investigation. A variety of experiences in several disciplines are possible, many of which are concerned with the ongoing problems of managing wildlife and protected refuge area.

One advantage of investigations by classroom groups is that a large pool of data can be quickly gathered by several teams of students. Comparisons and large scale patterns of interrelationship may then be later discovered, shared and discussed in the classroom.

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PRACTICAL ASPECTS OF ENVIRONMENTAL EDUCATION

Thomas O. Harris, Commissioner, Department of Natural Resources and Environmental Protection

Your efforts over the past 20 years have brought about many advances in the techniques being used in teaching our children about conservation. We all realize that education is a changing, challenging and continuing process. We hope that we are flexible enough to institute change when it is called for and firm enough to retain status quo when it is to our advantage.

We in the United States, in my estimation, are now facing one of the greatest crises in our entire 197-year career as a nation. Without attempting to be an alarmist, I feel that we could well be facing our most severe national food shortage. You and I realize that our agricultural surpluses of just a few years ago have now been reduced to almost zero. Our national leaders have used our hountiful stores of grain as an international diplomatic tool. Grain--not watches, not automobiles, not transistor radios--has been used to open the doors to the iron and bamboo curtains of Russia and China. These same transfers of grain have assisted us in preventing the dollar trade deficit from ruining our economy completely. Our agricultural production is without a doubt the greatest achievement we have made in the eyes of the entire world. The Dust Bowl years of the '30's have been changed, with help from above, into seasons of plenty. We think we can--with our limited area of productive land--feed this world for a long period of time. Our farmers are doing a magnificent job of producing food now. They can, I am sure, increase the productivity of our nation even more. They probably will need help and assurances that their labors will be rewarded. It is hard for them to invest money, land, time and effort when for them, there is no protection like pensions or tenure to fall back upon.

At this particular moment, in the face of rapidly rising food prices, we are observing a nation rearranging its economic priorities. I don't know what the outcome will be. Will we spend more money for microwave ovens or will we spend it for higher priced foods to cook in the old oven. The outdome is uncertain at this point. I do feel that the dreded malady, "mis-meal cramps" will force a realignment of our sense of values for basic things.

In addition to the current food crisis, we have entered into a period when the nation's energy supply is in question. The eastern seaboard is receiving 90 percent of its petroleum and gas needs from other nations.

The interplay of our natural resources, environmental consideration and economics is so vast that many of our students are unaware of their existence or consequences. Right now, we have a number of power plants in the northeast which have been converted from coal to oil because of air pollution control requirements. This has caused us to need more oil than our domestic suppliers can provide, so, we increased our oil imports. We are now paying annually some $7 billion for oil and gas from other nations. Some of these countries are less than stable and no one is certain they will continue to ship to us. Our projections indicate oil and gas imports will rise to $14 billion by 1975, $30 billion by 1980, and to $54 billion by 1985.

These imports are a tremendous strain on our economy. They also place an uncomfortable dependence on the sometimes fickle international political scene. Do we feel we can afford the economic and political pressures? I say we cannot. It seems to me that we would be losing our ability to guide our own destiny.

Think of the United Nation's studies showing that by the year 2000, 90 percent of the nation's petroleum resources will have been exhausted and 85 percent of the gas reserves will be gone. By the same token, we will have used only 2 percent of the world's resources of coal. I remind you that about half the known reserves of coal are right here in our own United States.

Coal is considered a "dirty fuel." When burned, it creates ash and sulphur dioxide, both of which are problems at this time. The nation's electric power plants are probably the greatest polluters of the air in Kentucky. Modern technology has been developed which will remove about 98 percetn of the particulate matter coming out of stacks. Sulphur dioxide, however, cannot be removed easily. As a matter of fact, I have recently talked with Mr. Fri of the Federal Environmental Protection Agency and he expressed the view that a process developed by Louisville Gas and Electric Company at one of its local generating stations shows the most promise for curbing SO_2 emissions. At the time I was talking to Mr. Fri, this plant had been in operation only two weeks and was not a tried and true success.

I do not feel it is right for me to force utility companies to install untried and unproven equipment. I would rather be certain that we have a process which will achieve our clean air goals before I force the expenditure of millions of dollars for such equipment. I remind you that the installation of such equipment would not cost the utility companies one cent. It will, however, cost you and I as consumers a considerable amount--perhaps up to 30 percent more than we are now paying.

We have been advised that the Japanese do have a process capable of removing much of the sulphur dioxide from the stack emissions. However, on investigation we found they simply dump the sulphur sludge into the streams. This does not seem to me, a practical environmental solution. If we transfer a sulphur dioxide problem from the area of air pollution to one of water pollution, we have not advanced very far.

However, if the Japanese solidify the sulphur wastes, they will have created a solid waste problem rather than an air or water pollution problem.

We have 8 power plants in western Kentucky. If the sulphur coming out of their stacks were solidified, 45,000 tons of waste material would be created each day. Just what would we do with this waste?

As we move into the coming school season, we are likely to enter a new phase of the nation's energy crisis. I am told that a hard winter will probably bring a shortage of both gas and fuel oil.

Production of electricity will be sufficient for demand except in certain areas such as the big eastern cities. If and when, however, the strictest application of sulphur dioxide emission standards are applied, certain power plants in the northeast and southeastern United States will be closed and we will have a shortage of power by 1975 which may be 25 percent less than the demand. This would not be a dim-out or a brown-out. It would be a black-out. It might well affect us here in Kentucky too--if the Federal Power Commission requires utilities here in Kentucky to share their power production with other states. So, in spite of the fact that we are the number one coal producing state in the nation, we may be faced with the same shortage as others.

It is my job, as Commissioner of the Department of Natural Resources and Environmental Protection, to guide this state's efforts in cleaning up our environment and protecting the vital natural resources of the commonwealth. I am not a prophet of gloom and doom. I guess I was born an optimist because I don't think our surroundings are hopelessly mired in our own fouled nest. We've damaged and we've wasted, but the damage is not permanent and the waste was not all in vain.

In the centuries we've been here on the North American Continent, we have welded together the strongest nation and the most viable economy on the face of the earth.

We can clean up the waters of Kentucky. It is going to be a real sacrifice on the part of our population to achieve the job. We estimate the cost of waste water treatment plants for Kentucky at 2.2 billion dollars.

Just where is this money coming from? We feel we can't call on state and local funds for these needs. In order to comply with the Federal Clean Waters Act of 1972, we were to receive federal funds to do the work. Congress authorized $5 billion for fiscal year 1973 and $6 billion for fiscal year 1974. Prior to the 1972 Act, Kentucky did receive 1.6 percent of the total appropriation for construction grants. Because Kentucky had already made progress on its own, the needs formula was changed and our portion of the pie was lowered to .66 percent.

Now, we in Kentucky are expecting to receive 13.2 million Federal dollars in this fiscal year and 19.7 million in the next. We need a nimimum of 200 million per year if we are to achieve our goals in accordance with the Federal deadline of 1983.

Getting back to our energy crisis--which is most certainly linked with our natural resources and the environment, I look to coal as the energy source of the future and I know research can increase its usability. My staff member on energy is looking into the possibility of removing sulphur prior to burning. He is also staying abreast of new developments in coal liquification, and gassification. We know the Germans learned how to liquify coal in 1927. By the end of World War II, most of their automotive and aviation fuels for the military were produced from coal.

Because coal is so important to the future, the nation and Kentucky are increasing their surface mining activities. Over half our coal is being strip-mined now and I am charged with minimizing the environmental effects of that industry. The Kentucky Legislature has spelled out our responsibilities and we are carrying them out. Strict adherence to our rules will insure a minimum of surface disturbance, quick vegetative cover for erosion control, and a rapid return to productivity. We recently had a report of 40 bushels of wheat per acre on reclaimed land. It's not a record crop but it does show what can be done when the effort is made to bring back productivity.

There is an exciting new technology for the generation of electric power from coal called Magnetohydrodynamics. This promises to approximately double the amount of power generated from burning the same amount of coal. To me, doubling the amount of power is a very definite contribution to the conservation effort.

About one percent of our current power generation can be credited to nuclear power. It may go to 12 percent by 1985. It is clear though that coal must be our major source of power for the next one or two decades. Nuclear power may have been oversold to the American public in its early development as an energy source. Only time will tell.

I honestly admit that I do not know when each of our environmental problems will be solved or who will perform each task. I know it is the responsibility of business, industry, government, individuals and school officials to work together for the solutions. We will not solve our problems overnight. I can tell you who is going to pay for the solution. Each of us, you and I, will have to pay the proportionate cost of cleaning up after ourselves.

There is no free ride here. There is no quick and easy solution. We will have to determine the rate we are going to clean up after ourselves--knowing full well that we must pay for the job, either in a damaged environment or in cash.

As you return to the business of educating our young people in the conservation of our natural resources and in the cleaning up of our environment, I would ask that you remain cognizant of the practical aspects of these tremendous jobs.

I sometimes become alarmed when I hear advocates of a policy which call for immediate correction of problems that have been accumulating since 1492.

I remind you that we will not reach utopia tomorrow. I think it would be well for our young people to be alerted to the financial sacrifices which must be made as we clean up this environment. They should know that a goodly portion of the efforts they put forth in their lifetime will have to be channeled toward cleaning up the damaged environment and toward cleaning up after themselves as they go. These young people must have this appreciation of the importance of financing each of these projects and they must be made to want to contribute their fair share.

We are counting upon educators like yourselves to not only make students aware of the bad conditions of our environment but rather to also guide them in constructive programs to alleviate those conditions. Your students and your programs very definitely need to recognize the dangers of the consumption of our resources and the pollution problems as they exist. They must also have their efforts channeled toward correcting our own generation's oversights.

I would ask that you give the practical aspects of natural resource and environmental problems very careful scrutiny. Certainly, the national and international economics must play a part in the progress we make. I am confident of the resource and environmental future, just as you are confident of the educational future of our new generations. We need to be rational and thorough in our treatment of the total problems and the environmental solutions. You--more than anyone--can have a profound effect on the soundness of our approach.

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Shanley, Tony
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20TH ANNUAL BUSINESS MEETING
August 15, 1973

1. The business meeting was called to order by CEA President Clarence Billings.

2. The minutes of the 1972 annual meeting were accepted as presented in the annual report.

3. The Secretary's report was as follows:

The 1973 election results are as follows: W. Jane Westenberger, Washington, D. C. - President
Neil Jenkins, Missouri - Second Vice President
John Faulk, Kentucky - Director (Central) 1973-76
John Hewston, California - Director (West) 1973-76

Membership Services: Newsletter - Newsletter was edited by Bill Vogt, New York, and the last issue by Jane Westenberger, Washington, D. C. Four issues were prepared in the past fiscal year.

Packet Service - Four mailings of material, activities and general information were mailed from the Conservation Foundation, National Wildlife Federation, Soil Conservation Service, Reader's Digest reprint, Environmental Protection Agency and related organizations. Packet service also mailed the annual report to all members in the organization.

The 1973 election was also prepared and mailed from the Secretary's office.

Current membership is down about 5 percent over the past year. A membership committee and a coordinated drive would be in order.

Secretary's Activities: Housekeeping activities and membership renewals, solicitation of new members, mailing of CEA inquiries covered many areas. Job inquiries, requests for information, materials, services, solicitation for funds, CEA stands on controversial environmental issues were some of the activities of the Secretary's position.

Sale of miscellaneous CEA materials included the "Guidelines," publications, buttons and the official CEA pin were also handled.

The position of Secretary-Treasurer of the CEA is handled with assistance of a part-time stenographer-secretary who handles much of the routine correspondence, membership and miscellaneous sales.

The Publications Committee, of which the Secretary is a member, works with our publications representative, Interstate Printers, Danville, Illinois. In progress at this time are publications of the updated "Bibliography" and reissuing of the "Degree Granting Institution for Environmental Careers."

The Secretary-Treasurer position is bonded through the Reitan-Lerdahl Insurance Agency of Madison, Wisconsin, for $50,000 subject to an annual audit to be submitted to the membership each year.

Your support, cooperation and patience in the operation of the CEA is appreciated by the Secretary and the entire membership.

The Secretary's report was accepted as presented.

4. The Treasurer's report was as follows:

Account with the United Bank of Westgate, Madison, Wisconsin

BANK TRANSACTIONS

Bank Balance, July 1, 1972	$ 590.73
Receipts	6,765.77
Transfer from Savings	3,000.00
Disbursements	(-) 9,074.23
	$1,282.27

SAVINGS ACCOUNT TRANSACTIONS

Savings Account Balance, July 1, 1972	$8,695.51
Interest Receipts	352.54
Deposits	1,525.00
Transfer to Checking Account	(-) 3,000.00
	$7,573.05
TOTAL CASH ASSETS	$8,855.32

Bank Balance, June 30, 1973	$1,282.27
Savings Account Balance, June 30, 1973	7,573.05
TOTAL CASH ASSETS	$8,855.32

I verify as of June 30, 1973, that the Conservation Education Association checking account balance in the United Bank of Westgate, Madison, Wisconsin, is $1,282.27 and the Savings Account Balance is $7,573.05 for a Total Cash Asset of $8,855.32.

/s/ Russel Perttunen
Russel Perttunen
Accountant

The Treasurer's report was accepted as presented.

5. Publication report - Neil Jenkins, Chairman. In the past year, the CEA has been working on the following publications: The Environmental Bibliography is in the process of being compiled and at the printers now. CEA currently has the Directory of Degree Programs and the Critical Index of Environmental Films for Man and the Environment available for sale. The old bibliography published three years ago is about exhausted, and the new publication should be mailed to all members in November. Again, Mr. Jenkins asked for help from the members, both in the CEA Newsletter and the publications program.

6. Alliance for Environmental Education - Richard Myshak, Minnesota. Mr. Myshak presented a progress report on the Alliance for Environmental Education. Sparked by the leadership of the Conservation Education Association, the Alliance now has 22 members. We are actively recruiting for an executive director at this time, and are considering other agencies that have applied for membership. He referred to the current Newsletter for additional information and questions on the Alliance. The concept of the Alliance is good and the possibility of pooling services and in organization of independent agencies as the central office is feasible. Questions from the audience were answered collectively by Jane Westenberger, Edward Ambry, Richard Myshak and Clarence Billings. The Committee was thanked by CEA President Billings for their help and assistance in the program.

7. 1974 Conference is to be held August 11-14, 1974, at the College of Environmental Sciences and Forestry, Syracuse, New York. The inventory conducted by the conferees would give direction and assistance to the 1974 Conference. Periodic reports on the Conference program will be available in special mailings to all members.

8. 1975 Conference is scheduled for early August at the University of Florida, Gainesville, Florida. Mr. Ira Bray of Atlanta, Georgia, briefly recapped the activities of program and the physical operations. Again, progress reports will be available through normal CEA communication channels.

9. The following resolutions were read by Claude Crowley and adopted by the membership:

WHEREAS, Clarence E. Billings, Nancy Ayers, David G. Engleson and W. Jane Westenberger have served as elected members of the Board of Directors of the Conservation Education Association, a...

WHEREAS, each has completed his and her respective term of office, and

WHEREAS, Clarence Billings, having served as a Director from 1963 to 1966, Conference Chairman in 1967, and as the eighth President for two terms 1969 to 1971 and 1971 to 1973 (a distinction shared only by two of the former presidents--Charles Mattison and Dr. Wilson Clark), and

WHEREAS, Nancy Ayers, who always adds color to the Annual Conference has completed her three-year term as Director, and

WHEREAS, David Engleson, an energetic environmental educator has served a two-year term as Second Vice President, and

WHEREAS, Jane Westenberger, a tireless worker for the Conservation Education Association has served a three-year term as Director, and

WHEREAS, all four of these members have contributed hundreds of hours, immeasurable energies, and dedicated services

THEREFORE, BE IT RESOLVED, that the members of the Conservation Education Association extend a sincere vote of appreciation to Clarence, Nancy, David and Jane for their contributions to this organization in its pursuit of the objectives as defined in its Constitution and By-Laws, and, that the members of this organization welcome back to the Board of Directors Clarence Billings to serve as Immediate Past President for an indefinite term of office, until this organization again has a new Immediate Past President, and, that the members of this organization pledge their support to Jane Westenberger as she returns to the Board of Directors for a two-year term of office, 1973 to 1975, as the ninth President of the Conservation Education Association.

* * * * *

WHEREAS, Robert O. Ellingson has served as an appointed member of the Board of Directors as Secretary-Treasurer having been appointed by President Olin Capps from 1963 to 1965, by President Wilson Clark from 1965 to 1967 and again appointed to serve four years from 1969 to 1973 by President Billings, and

WHEREAS, prior to serving as Secretary-Treasurer, he was the Conference Chairman for the Annual Conference held at Wisconsin State College at Stevens Point in 1962, and

WHEREAS, Bob Ellingson has dedicated a generous portion of his professional career, over a long period of time, to the needs of members and has carried out the organizational demands associated with the office of Secretary-Treasurer of the Conservation Education Association.

THEREFORE, BE IT RESOLVED, that the members of this Association vote Bob Ellingson a well deserved "Thank You" for assuming the responsibilities of the Office of Secretary-Treasurer and for his unselfish devotion to the numerous tasks inherent in this important post, and, that the members grant Bob a short furlough for rest and relaxation before the organization drafts him again for future service.

* * * * *

WHEREAS, outstanding program features of the Conservation Education Association National Conference would have limited value if they were not gathered and published, and

WHEREAS, the job of preparing the published proceedings has traditionally been one requiring effective conference participation and effective workmanship after the conference is over, and

WHEREAS, Barbara Horn has for the past three years done an outstanding job of documenting the conference and preparing the proceedings, as well as carrying out other vital conference assignments too numerous to list.

THEREFORE, BE IT RESOLVED, that the Conservation Education Association in its annual business meeting tend the deep appreciation of the members, directors, and officers, for the effective contributions of Barbara Horn to the national organization, and

BE IT FURTHER RESOLVED, that the CEA President record this official recognition to Barbara Horn in a letter of commendation and thanks on behalf of all CEA members.

* * * * *

WHEREAS, the many agencies and groups involved in the 20th Annual Conference resulted in a successful meeting with an effective program and cooperative spirit, and

WHEREAS, certain people made unusual contributions to the conference, and

WHEREAS, the conference participants who benefitted from the fine program, arrangements, entertainment and exchange of ideas wish to thank those who did such a worthwhile job.

THEREFORE, BE IT RESOLVED, that this conference officially commend and thank those listed below, and

BE IT FURTHER RESOLVED, that the President of the CEA, on behalf of all conference participants, write a letter to these people, and where possible, send a copy of the letter to the individual's supervisor:

Clyde Hibbs, Ball State University; Wayne Williams, Murray State University; John Paulk, Tennessee Valley Authority, James Gilpin, Kentucky Department of Fish and Wildlife; Lynn Hodges, Kentucky Department of Education; and Future Farmers of America (to program advisor).

* * * * *

WHEREAS, the conduct of the 20th Annual Meeting of the Conservation Education Association has been a wholesome reflection of the theme, "Environmental Progress Through Cooperation in Education," and

WHEREAS, this spirit of cooperativeness is an accurate indication of the dedication and effective work of many who worked on the program, arrangements, publicity, and other aspects of the conference, and

WHEREAS, the local leadership that made this conference possible was given by the host University.

THEREFORE, BE IT RESOLVED, that the CEA officially express its appreciation to Dr. Harry Sparks, President of Murray State University for his participation, hospitality and leadership, and

BE IT FURTHER RESOLVED, that a letter of thanks expressing the substance of this resolution be sent to Dr. Sparks, and

BE IT FURTHER RESOLVED, that the letter single out the fine work of the conference coordinator, Mr. Wayne Williams, and that a copy of the letter be sent to Mr. Williams.

10. Resignation of Secretary-Treasurer - Secretary-Treasurer Robert Ellingson, read his resignation, which was accepted by the CEA Board. The office of Secretary-Treasurer is to be transferred to Dr. Robert Cook, University of Wisconsin-Green Bay. The details of the transfer and activities were briefly explained to the members and the Secretary-Treasurer expressed support in the transfer of this office to Green Bay.

11. Introduction of New Officers - President Billings introduced new officers and administered the oath of office to all members. These were Jane Westenberger, Neil Jenkins, John Paulk and John Hewston. The membership witnessed the oath of office ceremony.

12. The meeting was declared adjourned with the President thanking the CEA membership for their support, participation and concerns for the organization. He again thanked the host state, host college, committees and wished the membership a safe and speedy trip home.

Respectfully submitted,

Robert O. Ellingson

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